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The Science of Production Organization

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BY

E. H. ANDERSON, PH.D.

Professor of Management
University of Alabama

AND

G. T. SCHWENNING, PH.D.

Professor of Business Administration
University of North Carolina

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AND
GUSTAV T. SCHWENNING

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PREFACE

Our intensified search for greater efficiency in industry has brought forth a vast literature on business organization and management. However, almost all these books deal mainly with various aspects of management and only incidentally with organization. There are few books devoted wholly to an examination of organization in a systematic fashion. Yet management functions through the instrumentality of organization, and its effectiveness is largely dependent upon the soundness of its organizational structure. There is therefore a real need for further examination of organization procedure.

This volume consists of a brief outline and description of the fundamentals underlying the process of organization for effective production. A considerable body of thought, usually presented under such headings as "internal" or "control" organization, exists on the subject. Much of the published material is inaccessible and not infrequently contradictory. Many of the scattered and fragmentary contributions have here been brought together, examined, integrated, and made easily available.

A careful study of the subject leads to the conclusion that there is a science of organization, and that the science is the product of evolution rather than of a single theory. It has evolved by aggregation, by combining and blending the ideas and practices of many contributors rather than by reasoning from the premises of a few masters. Thus the sources used in this study consist mainly of the writings of professional consultants in organization and management, business executives, and teachers and students of economics and of business organization and administration.

A work of this sort that attempts to appraise and synthesize the thoughts of numerous writers should be extremely fair and unbiased. Many challenging theses must be mentioned merely in passing or else entirely ignored. Wherever a definite position has been taken in this study, it has been done not with a view to entering into controversy with people who have expressed certain concepts but with a view to helping in the building up of a unified and useful body of information.

In the hope of being fair to the several contributors, the method here used is that of quoting their exact words rather than merely citing them. This has seemed preferable also for the following reasons. (1) An effort has been made to heed the familiar admonition, "for the reader's sake, stay out of footnotes." The main body of the text has accordingly been made to carry much material that otherwise might have been relegated to footnotes. (2) The problem of organization is an old one, and one about which much has been written. When one finds his idea adequately expressed by another, there is every reason for quoting the author's words rather than paraphrasing them. (3) Production organization as here delimited has seldom been treated exhaustively as a separate and distinct subject, but has been dealt with incidentally in treating the subjects of administration and management. It is preferable that references to such treatises should be accompanied by the exact words of their respective authors. (4) Finally, there are few, if any, outstanding authorities on production organization in the scope in which it is here conceived; there is no "high priest" among the many writers, from whose words students may safely reason deductively at great length. The science of production organization is the product of many contributors who have worked independently, and who have usually been more prone to argue and to magnify their differences than to reconcile them. A work that attempts to harmonize and synthesize such diverse opinions is on safer ground if it quotes verbatim.

The general outline of this study follows that of no other work. It is different in the following several particulars. First, the process of organizing begins with extremely small units and culminates in units of tremendous size; it begins with the Gilbreths' tiny therblig and ends with, perhaps, an entire industry. The stages in this process are: (1) operation study or job analysis, as it is variously designated; (2) plant or individual enterprise organization, or production organization proper as it is ordinarily conceived; (3) integration; and (4) rationalization. The last two of these stages are treated only in summary fashion and chiefly in order to suggest the logical development of the process of organization and the possibilities of its application. Second, organization procedure is conceived of and developed as a dual process. It consists, on the one hand, of the organization or systematization of the work to be done, and, on the other, of the organization of the human effort required to accomplish this work. The latter of these two phases, designated for convenience as organization structure, takes into full consideration the personnel which provides the human effort needed. Third, production organization is regarded as an integral part of the subject matter of scientific management. It originated as a science in the scientific management movement, and it is developed as one aspect of the general problem of administration and management.

This work is unusual also in that it makes an effort to harmonize the philosophy of scientific management and economic theory. Scientific management, including as it does production organization, is held properly to lie in the field of production economics. Scientific management is concerned with the technique by which the factors of production are combined and by which economic goods are produced. Moreover, scientific management through motion and time study analyzes labor, or human effort, as a productive factor and thus offers a contribution to the better understanding and possible solution of the labor problem. Scientific management is furthermore concerned with administrative efficiency, with industrial organization, and with national and international economic planning. These are likewise all problems, of course, of economics.

It should be noted that this study places particular emphasis upon the therblig as the elemental unit of manual labor. This unit is being widely used in industry today as a standard measure of human performance, and it is hoped that the emphasis given it here may serve to attract the attention of other students for its further study and exposition.

In a sense this is the work of the many authors whose writings have been referred to and quoted. Acknowledgment is hereby expressed to them and to their publishers for permission to quote so extensively. Deep appreciation is also expressed to Professors John B. Woosley, Harry D. Wolf, Milton S. Heath, and Malcolm D. Taylor of the University of North Carolina for their valuable criticisms and suggestions. The authors alone are accountable for the views and conclusions contained in this study and for its shortcomings. Finally, the volume is the product of years of joint effort. The entire text was written by E. H. Anderson; G. T. Schwenning conceived the scope of the study, directed it, and prepared it for publication.

CHAPEL HILL, N. C.,
April, 1938

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THE SCIENCE OF PRODUCTION ORGANIZATION

CHAPTER I

INTRODUCTION AND DEFINITIONS

CONFUSION REGARDING ORGANIZATION

Although the problem of organization is as old as the hills it is still unsolved and unsettled. "On this subject of Organization," says Sheldon, "there is probably more confusion of thought than on any other aspect of management."[1] Business men in general do not recognize "organization" as a science within itself, or hardly as a problem capable of scientific treatment. Organizations are usually what they are as the resultant of providing for the other factors in the situation, or, like little Topsy, they "just grew." The present state of confusion can be no better expressed than by quoting from one who has studied the subject in truly scientific fashion.

> When recourse is had to the authorities for the fundamentals of organization, an astounding lack of agreement is found. From what these various authorities say, I do not believe they know they are disagreeing. One would be prone to believe that writers on organization do not read one another's books. With few exceptions, it seems that each writer has heard of line, staff and functional types of organizations, and thinks that within the limits of these three types lies the whole gamut of the science of organization. Attempts to seek for or to develop fundamentals are sporadic and fragmentary. The usual discussions are of the type that are usually both elementary and hazy and the illustrations are anything but illuminating.
>
> The present status of the science of organization is

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[1] Oliver Sheldon, *The Philosophy of Management* (London: Sir Isaac Pitman and Sons, Ltd., 1923), p. 101.

> that there is no science. Every man who attempts to organize today does so on the basis almost wholly of his own experience and ideas with results that are far from uniform or ideal. The science of organization awaits another Frederick W. Taylor, a man on the inside of business who can and will spend his time in analysis and investigation and freely pass his information on to others.[2]

That such is the present status of the science of organization may be questioned. Much has been contributed to the subject since this statement was written in 1929. However, much of this material is still confusing and conflicting, a condition that indicates that organization as a science is still in the developmental stage. The main purpose of the present study is, accordingly, to enhance the further clarification of this material and to synthesize the various contributions of other students of organization in order to assist in forming a more systematized body of thought.

THE SCIENCE OF ORGANIZATION

The science of organization has seldom been disassociated from the art of organizing as practiced by individual organizers. "Get the right man and the organization will take care of itself," is a rule-of-thumb method of wide recognition and use. Although a good organization may be recognized as distinct from the members who compose it, yet the ability to organize is still regarded as a more or less inherent capacity of the individual. It is not uncommon to find "ability to organize" listed as one of the character or personality traits or aptitudes on reference blanks and rating scales used in selecting and promoting workers and executives. In fact, it is sometimes said that good organizers are born, not made, and that there is such a thing as a genius for organization. For example: "To my mind there is no bent of mind more dangerous than that which is sometimes described as the 'genius' for organization."[3] On the other hand, organization ability, instead of "genius," may be regarded as nothing more than common sense. This idea may be discredited as follows:

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[2] Thomas R. Jones, *Theories and Types of Organization*, Production Executives' Series: No. 83, American Management Association, 1929, p. 8.

[3] From *My Life and Work* by Henry Ford, in Collaboration with Samuel Crowther, copyright 1922 by Doubleday, Doran & Co., Inc., p. 91.

> Unfortunately, there is a general impression, not by any means confined to industry, that organizing is simply the application of common sense, and that common sense is a capacity which is common. There are few slights more resented than the suggestion that a person cannot organize. It is normally taken as a suggestion of a lack in everyday mental capacity. The capacity for organizing, however, is not wholly common sense any more than common sense is common. There are admirable managers with a great fund of common sense who cannot organize, and indeed cannot grasp what organizing means. . . . In industry most managers are confident that, though they may have failings, they certainly do not lie in the field of organization. . . . Least of all has it [organization] been regarded as a profound scientific problem capable of analysis on a scientific plan, and of solution according to scientifically determined principles.[4]

Most of this confusion of opinion concerning the nature of organization and the capacity to organize arises because of the failure to distinguish between the capacity to organize and the capacity to manage or execute. Organizing ability and executive ability are not synonymous terms.[5] The good organizer should be a student and a planner. "The process of building up an organization that shall be the best for a certain factory depends primarily upon scientific research work. . . ."[6] The principle is the same here as elsewhere in scientific management, that planning and execution or operation are separate and dissimilar functions. "Management properly begins after the organization has been perfected . . .".[7] The work of the organizer is more purely scientific and more creative in purpose, whereas the work of the manager or executive consists in staying on the job and "running the organization." Operating executives' "minds do not have time to function on the creative side."[8] It is their duty to apply the principles and to put into practice the plans and policies of the organizers and planners.

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[4] Oliver Sheldon, *op. cit.*, pp. 101-102.

[5] See Henry P. Kendall, "The Problem of the Chief Executive," in Edward E. Hunt (ed.), *Scientific Management Since Taylor* (New York: McGraw-Hill Book Company, Inc., 1924), p. 67.

[6] Hugo Diemer, *Factory Organization and Administration* (3d ed., New York: McGraw-Hill Book Company, Inc., 1921), pp. 24-25.

[7] From Samuel E. Sparling, *Introduction to Business Organization* (1919), p. 5. By permission of The Macmillan Company, publishers.

There is, however, one point upon which there is little confusion of thought or disagreement of opinion concerning the question of organization. That is, that an organization should be logical. Even the non-theoretical, practical, business executive insists that an organization must be logical, and that his organization, regardless of how it might appear to an outsider, is, of course, logical. Beyond this agreement, however, confusion and disagreement still exist, for logic in organization structure may mean one thing to one person and something else to another, and it frequently does. Perhaps the admission that an organization must be logical does imply, however, that there should be some basis or bases for the logic of its structure, and that in order to determine a logical basis there should be a science of the thing. Accordingly it is being recognized that ". . . the question of organisation calls itself for special research and study."[9] And, as Urwick continues: "The possibilities inherent in this subject have, as yet, been imperfectly realised by business men."[10] Furthermore: "Everywhere men are giving thought to the implications, the applications, the possibilities of the scientific approach in business and social organization."[11]

Thus, organization is a problem permitting of and worthy of scientific study and treatment; it is no longer to be regarded as a matter of genius, mental aptitude, common sense, or abstract logic. It is to be studied by the method of the scientist who observes, analyzes, and classifies facts, makes inferences from these facts, and verifies these inferences. Already so much concerning organization has been discovered, and tested by years of experience, that this body of knowledge cannot be justly ignored by the business executive or the student of organization and management. Moreover, this body of knowledge has grown far too extensive and too complex to be grasped or fully appreciated without careful and systematic study.

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[8] Henry P. Kendall, *op. cit.*, p. 68.

[9] L. Urwick, *The Meaning of Rationalisation* (London: James Nisbet and Company, Ltd., 1930), p. 101.

[10] *Ibid.*

[11] Henry P. Dutton, *Principles of Organization* (New York: McGraw-Hill Book Company, Inc., 1931), p. vi.

The chief difficulty in establishing the science of organization as such is encountered in convincing those who continue to rely only upon their own personal experience and offhand observation for proof and acceptance. Excellent as this test may be in certain situations, it has its definite limitations. As concluded by Alfred Marshall in defending the reliability of certain economic doctrines:

> Therefore an economic doctrine cannot be tested, as has frequently been suggested, by such questions as:—"Consider your own case: would the doctrine be true in regard to it?" The answer to that question may probably be in the negative; and yet the doctrine may be true in regard to the general case to which it claims to apply. If so, its practical importance will be increased by the fact that its truth would not be likely to be suggested by the ordinary experience of life, and could be grasped only by considerable observation and thought.[12]

Another difficulty in establishing organization as a science in the minds of some arises from the numerousness of what are noted as the differences in organization procedure and structure. These differences are both numerous and real, but they should not be allowed to obscure likenesses which are just as real and even more numerous. This problem arises in all sciences and especially in the social sciences. It is recognized by Woodworth in the science of psychology. He makes the following distinctions: "Differential psychology:—One line of question that always interests the beginner in psychology is as to how people differ."[13] "General psychology:—Our science is not concerned entirely with differences between people, but asks also in what ways people are alike, and this is indeed its central problem."[14]

[12] From Alfred Marshall, *Industry and Trade* (3d ed., 1920), p. 679. By permission of The Macmillan Company, publishers.

[13] Robert S. Woodworth, *Psychology: A Study of Mental Life* (New York: Henry Holt and Company, 1921), p. 2.

[14] *Ibid.*, p. 4.

What is needed in order to comprehend order and uniformity in the great body of experiences, observations, and practices is an understanding of the method of statistics and of statistical inference. Without resort to this method, generalities with respect to complex social phenomena are largely impossible. As illustrated by J. G. Smith:

> The reason why Aristotle did not attempt to build up a theory of inductive reasoning (except by reference to causation) is because he could see no order in the chaotic appearance of experience. Facts occur one by one in a seemingly unrelated fashion. Particular events to him and to the men of his day were an impregnable mass of occurrences without definite meaning. . . . He did not understand what we call today the theory of sampling, he did not know the theory of probabilities.[15]

It is by the utilization of the inductive method that the vast body of information now existing can be generalized and synthesized to form the basis for a science of organization.

THE IMPORTANCE OF ORGANIZATION

Although organization has not been so generally regarded as a science, the importance of organization in business enterprises has wide realization. A few quotations from well-known authors will serve to show to some extent the degree of importance attributed to this factor. According to Emerson: "The industrial hook-worm disease is defective organization."[16] Diemer: "There is no greater source of economy than conservation of human energy through efficient organization."[17] Follett: "We cannot now foresee how far changes in internal organization will change business policy. . . ."[18] Brisco: "The two chief essentials in every business are capital and organization, but the latter is the more important."[19] Knoeppel: "In the analysis of the organization of a large number of concerns, the trouble found in the majority of cases was not so much inefficient individuals as the improper placing of efficient individuals."[20] Urwick:

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[15] James G. Smith, *Elementary Statistics: An Introduction to the Principles of Scientific Methods* (New York: Henry Holt and Company, 1934), p. 322.

[16] Harrington Emerson, *The Twelve Principles of Efficiency* (5th ed.; New York: McGraw-Hill Book Company, Inc., 1919), p. 29.

[17] Hugo Diemer, *op. cit.*, p. 23.

[18] M. P. Follett, "Business as an Integrative Unity," in Henry C. Metcalf (ed.), *Scientific Foundations of Business Administration* (Baltimore: The Williams and Wilkins Company, 1926), p. 165.

[19] From Norris A. Brisco, *Economics of Business* (1920), p. 76. By permission of The Macmillan Company, publishers.

> The whole question of the proper distribution of duties between individuals in an enterprise is still little appreciated by business men. More than any other single issue it contributes to the accumulation of unnecessary waste, and its faulty adjustment is largely responsible for much of the misunderstanding and bitterness which impair relations between employers and employed.[21]

And, finally, Andrew Carnegie: "Take away all our factories, our trades, our avenues of transportation, our money, but leave me our organization, and in four years, I will have reëstablished myself."[22]

Although the various scholars who have dealt with the question of organization have not failed to realize its importance, business men in general have been more reticent in emphasizing this particular phase of their enterprises. Business men, confronted with actual situations and not theories, perhaps seldom perceive in organization itself a problem. Reasons for their oversight are not difficult to discern. A first one may well be due to the intangible nature of organization. "The problems of administrative organization and control involve many intangible elements, such as human behavior and motivation, aims and purposes, objectives and goals."[23] Organization is something in addition to the aggregation of all the component parts; it is of the nature of an invisible force having no physical source but capable of producing definite measurable results.

As a second reason, defective organization is a business malady of a latent type—a hookworm disease. It saps the vitality of the enterprise and so weakens it that it succumbs to a more virulent type of disease as the apparent cause of failure. Even though poor organization may seldom be the direct cause of a failure, good organization might often have enabled the enterprise to overcome its other difficulties.

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[20] C. E. Knoeppel, *Organization and Administration* (New York: Industrial Extension Institute, Inc., 1921), p. 17.

[21] L. Urwick, *op. cit.*, p. 41.

[22] From Norris A. Brisco, *Economics of Business* (1920), p. 76. By permission of The Macmillan Company, publishers.

[23] Frederick L. Lamson, "General Administrative Organization and Control," in G. T. Schwenning (ed.), *Management Problems* (Chapel Hill: University of North Carolina Press, 1930), p. 237.

In the third place, poor organization, as well as many other defects, may be overcome or offset by other exceptionally favorable features in the business situation not enjoyed by competitors. As stated by Dennison:

> The importance of right structure of organization is sometimes undervalued, because with the right men almost any kind of organization can run well. This is true, but is by no means the whole truth. With the finest of personnel, an illogical organization structure makes waste through internal friction and lost motion; it fails to retain and develop good men and to invite into its membership new men of high quality.[24]

Finally, defective organization works its greatest havoc on the future, because flexibility for meeting new situations is not provided. An expansion of activities may throw the whole system out of balance; or the death of the chief executive or a moving spirit may leave the enterprise floundering without leadership. This last risk, however, is by no means ignored, for it is the practice of many companies to insure the lives of their major executives. Such life insurance might, therefore, be called organization insurance, for its purpose is to maintain the productive efficiency of the concern during a period when the organization is likely to be unstable. For these reasons the problem of organization as such may have been overlooked.[25]

Although students of management have, on the whole, considered organization to be of extreme importance to the success of a business establishment, they are, nevertheless, careful not to overemphasize this one feature to the exclusion of all others. According to Walker: "There is a tendency to overstress organization through elaborate planning. The means are frequently mistaken for the end. What is needed here, as in all other phases of administration, is some judgment in weighing the needs of a situation."[26] Even Mr. Dennison is cautious: "Principles of organization structure are good only insofar as they help build specific organizations better and more quickly than could be done by trial and error methods. There is nothing sacred in them of themselves."[27] Others emphasize leadership as the dominating force in business enterprise: "Wise leadership is more essential to successful operation than extensive organization or perfect equipment."[28] Again: "An organization is nothing in itself. . . . There is more danger, we are just beginning to realize, from over-organization than from under-organization because the former discourages leadership."[29] Such, however, are mere precautions against the notion that organization alone is a panacea for all business ills.

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[24] Henry S. Dennison, *Organization Engineering* (New York: McGraw-Hill Book Company, Inc., 1931), pp. 5-6.

[25] See also James O. McKinsey, *Organization Problems Under Present Conditions*, General Management Series, *G. M.* 127, American Management Association, 1936, pp. 4-5.

DEFINITIONS: ORGANIZATION

The problem of definition has often proved a serious obstacle to students of administration and organization. As Marshall has complained: "It is a pity to introduce a discussion of terminology into our work, but the terminology used in this field is by no means standardized."[30] The term "organization" is no exception to this general rule; each author usually defines the term to suit his own particular needs. Such a practice leads only to further confusion, for it provides one more definition for a word already much defined. A better policy would be to select some one definition as more or less standard and then reconcile all others with the standard. There will, of course, always be room for other definitions, but these should do no more than emphasize or elaborate certain aspects of the standard rather than change its basic denotation. Two definitions would then not conflict and thereby confuse the reader but rather amplify and clarify the idea sought to be conveyed.

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[26] P. F. Walker, *Management Engineering* (New York: McGraw-Hill Book Company, Inc., 1924), p. 217.

[27] Henry S. Dennison, *op. cit.*, p. 124.

[28] L. P. Alford, *Laws of Management Applied to Manufacturing* (Copyright, 1928; New York: The Ronald Press Company), p. 49.

[29] From *The Organization of Modern Business* by Wm. R. Bassett, p. 153. Used by permission of the publishers, Dodd, Mead & Company.

[30] Leon C. Marshall, *Business Administration* (Chicago: The University of Chicago Press, 1921), p. 1.

The chief variations in the meaning of organization arise not from the fundamental genus of the term, but from its inclusiveness or exclusiveness. These variations, however, should be, and often are, taken care of by an adjective modifier; and, in perhaps the majority of cases, the confusion arises from the indefiniteness in the meaning of the modifier instead of in the meaning of the term "organization" itself. For example, production, industrial, economic, business, factory, and administrative are terms which are not identical in meaning, and when used to modify organization their respective results are not the same. The component parts in production organization, in a general sense, are the four factors of production taken as such, and the completed organization is a producing unit combining two or more of these factors. In a narrow sense, production organization may refer to the arrangement and relationship of workers and facilities in an operating unit for the creation of utilities, as further explained below. Industrial organization begins with a producing unit or a combination of such units and relates them to others to compose a national or world system. The handicraft and the factory systems, as well as integrated enterprises, for example, are usually called types of industrial organization. The term is also applied—erroneously, it seems—to the geographical layout or localization of industries, and to the organization of manufacturing establishments, which is better distinguished as factory organization. Economic organization begins with economic units, which are usually producing units, but it is concerned primarily with the control of their activities. Capitalism, socialism, and communism are types of economic organization. Factory organization, as its name implies, is concerned entirely with the internal affairs of the factory. It is usually taken to include the arrangement and grouping of machines, flow of material, and other matters of technology as well as those of personnel control. The meaning of business organization is still somewhat nebulous.

The inclusiveness of the term, however, is indicated in the following:

> Business organization is the process of designing, arranging, and building up an effective economic unit. It involves the planning and setting up of mechanisms, means and devices for the accomplishment of predetermined ends. It has to do with the proper proportioning of productive resources and their correlation with human faculties so as to produce the largest volume of profits. It concerns the arrangement of the parts of the business organism so as to provide the most effective means by which to apply human and material energy to the creation of marketable goods.[31]

Another definition distinguishes between three terms often confused. It shows that administrative organization is only one part of the larger and more inclusive field of business organization. Here, however, as well as in the preceding definition, a word of emphasis is needed. As Professor Ely reminds us: "Business is acquisitive rather than productive, and while acquisition usually involves production, this is not invariably the case."[32] It is only with the productive aspects in contradistinction to the acquisitive aspects of business with which the present study is concerned. According to Stockder:

> The subject of business organization has usually been approached from one of two points of view. The first of these approaches is from the standpoint of the principles and problems involved in building up the legal form of organization under which the business is to be owned, and that bear upon the relations of the entrepreneur, the creditor and third parties to one another and to the business establishment itself. The second strikes the problem from the angle of the technique involved in making those internal arrangements that are necessary or desirable to secure efficiency in the administration and operation of the enterprise. For the sake of brevity, we shall call the sub-

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[31] Walter J. Matherly, *The Principles of Business Management* (Vol. I, Mimeographed; Gainesville, Florida: The University Press), p. 8.

[32] From Richard T. Ely, *et al., Outlines of Economics* (1931), p. 533. By permission of The Macmillan Company, publishers.

ject-matter of the first ownership organization and of the second administrative organization.[33]

Now, it is with the internal administrative arrangements as distinguished by Stockder, which we prefer to designate as "production organization," that this study is concerned. It should be noted in passing that business organization is broader in its scope than promotion. In fact, the latter is usually considered to be a subdivision of the former, for promotion deals entirely with new enterprises. The work of promotion consists principally of discovering the idea, investigating the proposition, formulating the plan, assembling the legal elements, and arranging for the initial financing of the new enterprise. Promotion merely brings together the ingredients of the new organization; it does not involve the detailed problems of unification and solidification.[34]

Coming finally to the term "production organization," the subject here under consideration, several definitions may be selected from various writers. By quoting several instead of only one, it is possible better to convey the whole concept involved in the term. In keeping with the practice of other authors, the briefer term "organization" is frequently used for the longer one "production organization" where there is no confusion as to what kind of organization is meant. Of the numerous definitions of organization, Sheldon's is possibly the most often quoted; it is the one that will here be adopted as standard. It reads: "*Organization* is the process of so combining the work which individuals or groups have to perform with the faculties necessary for its execution that the duties, so formed, provide the best channels for the efficient, systematic, positive, and co-ordinated application of the available effort."[35] Rubey offers a definition and description that is in close agreement:

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[33] Archibald H. Stockder, *Business Ownership Organization* (New York: Henry Holt and Company, 1922), p. v.

[34] See for example William H. Lough, *Business Finance* (1920), Chap. X on "Promotion"; Earl A. Saliers, *Handbook of Corporate Management and Procedure* (1929), Chap. III on "Promotion"; Lewis H. Haney, *Business Organization and Combination* (1934), Chap. XVIII on "Promotion as a Step in Organization"; etc.

[35] Oliver Sheldon, *op. cit.*, p. 32.

> In its industrial sense organization may be defined as the laying out of the duties of individuals and groups of individuals and of the line through which authority flows, so that the objects of the undertaking may be realized. It must (1) be logical, systematic, and scientific and definitely fix responsibility so as to secure the best results from a given expenditure, and (2) be personal, to the extent of taking into account the human aspirations, requirements, and necessities of the individual members so that their good will and best efforts are utilized and their business relations made pleasant.[36]

"Organization," says another authority, "is the division of work into its proper functions, jobs, and elements; their arrangement into correct relationships; and the assignment of them to individuals with clear definitions of responsibility, authority, and duties which will accomplish the policies of the establishment."[37] Farquhar's definition is somewhat more inclusive: "An organization is therefore essentially a complex of relationships of parts to the whole and to each other; more specifically of such factors as things to be done, persons doing them, methods of doing them, facilities for doing them, responsibility and authority."[38] Finally, according to Bliss:

> An organization is not merely a system of organic parts, of components and relations, but it is also *functionally* an interaction of forces, activities and purposes. . . .[39]
>
> All proper uses, however, have this in common that they mean *coherent* and *effective* relations of parts to the whole, the correlation of parts, or organs, to special actions, or effectual relations, or *functions*; and of the whole system to certain functions general or special.[40]

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[36] Harry Rubey, *Industrial Organization* (New York: Ginn and Company, 1931), pp. 52, 54.

[37] J. E. Walters, *Modern Management* (New York: John Wiley and Sons, Inc., 1937), p. 46. Reprinted by permission.

[38] Henry H. Farquhar, "Functional Organization," in The Taylor Society, *Scientific Management in American Industry* (New York: Harper and Brothers, 1929), p. 136.

[39] Henry E. Bliss, *The Organization of Knowledge and the System of the Sciences* (New York: Henry Holt and Company, 1929), p. 15.

[40] *Ibid.*, p. 74.

There are, then, several things that production organization, as here defined, does not include among its component parts. It does not include the physical arrangement of the plant, the machines and equipment, or the service centers, etc. This is usually distinguished by the term "plant layout." Neither does it include the course and the order of the processes and operations. This is taken care of by routing, and, when definite timing is involved, by scheduling, both of which are divisions of the larger function of planning. It is, however, quite concerned incidentally with these problems and with other problems of technology and economics, for organization must take these as part of the fixed factors of its problem and adapt its structure to them.

It will be noticed that, in the definitions given, the word "organization" is used in two different senses: (1) the process of organizing, and (2) the arrangement resulting from the process of organizing.[41] The process of organizing is the meaning of the term when it is said that organization is a function of administration. Its use in the second sense is made clear by the insertion of "an" before "organization" as in the last two definitions given above. A description and explanation of an organization, or of organizations, composes the subject matter of the study of an organization looked upon as a static phenomenon having at any time definite internal structural relationships. An explanation of the process of organizing consists of methods, procedures, principles, and laws, the subject matter of the science of organization.

The term "organization" may be interpreted also in two other ways. In one, an organization means only the plan or the on-paper organization, the skeleton outline of which is the organization chart. In the other, it consists of the actual physical parts, i.e., human beings. Likewise, the process of organizing may be divided, as may any other process or activity, into planning and execution. In the same way, planning itself may be divided into pre-planning and detail planning, and execution into preparation and operation. The process of planning the organization, or on-paper organizing, is that meaning with which the science of organization is concerned. The forming or building of the actual physical organization according to some plan or none is a problem of administration and more specifically of personnel management. The organization scientist or specialist deals with the structure and relationships of the work and the functions; the personnel department hires, trains, and assigns the functionaries to perform the various functions. The word "organization" is usually interpreted to mean both of these aspects, but sometimes it is the one and sometimes the other that is emphasized, the context of the passage making the meaning clear.

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[41] Thomas R. Jones, *op. cit.*, p. 11.

DEFINITIONS: ADMINISTRATION

One cannot conclude a discussion of the definition and meaning of organization without also defining the word "administration," of which the function of organization is said to be a part. So great is the difference of opinion as to the meaning of this word that to define it is sufficient to align one with either of two opposing groups. The one group makes administration the larger function and inclusive of the function of management. The other does just the opposite and defines management so as to include administration. Any reconciliation of the two definitions is, therefore, impossible; one must either define his terms anew or else take sides. The former course would [illegible]haps only add to the present confusion; the latter may help toward the agreement upon and establishment of a much-needed standard vocabulary. Our choice is in favor of administration as the larger and more inclusive function, of which the functions of organizing and managing are among its subfunctions. Several definitions more or less in accord with this conception may be useful. Thus Sheldon holds that "*Administration* is the function in industry concerned in the determination of the corporate policy, the coordination of finance, production and distribution, the settlement of the compass of the organization, and the ultimate control of the executive."[42] Burgess states that "By general administration is meant the determination of the general policies of the business, the adaptation of general plans to changing conditions, the coordinating control of the various major functions of the business and the appraisal of results secured by departments."[43] And according to Robinson:

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[42] Oliver Sheldon, *loc. cit.*

> Broadly speaking, administrative functions deal with the legislative and judicial branches of the organization; the executive functions with the enforcement of the legislative and judicial edicts; and the staff functions with the scientific advising of those who must make important decisions. When this differentiation is followed out, it is found that the administrative functions are chiefly concerned with the accomplishment of the business as a whole. . . .[44]

Finally, L. C. Marshall defines the term and distinguishes it quite clearly from other terms with which it is frequently confused. He says:

> Since the center of our problem is "control of business activities," such terms as "organization" and "administration" come up very frequently in our discussion. Probably little would be gained by an arbitrary standardization of these terms at this stage of our study. It will suffice for us to bear in mind that "control of business activities" includes three things: (1) the establishment of *policies*, (2) the planning and setting up of the *organization* which is to be used in carrying out those policies, and (3) the *operating* or running of the organization. Organization implies a fairly high order of creative work; that of planning mechanisms, means, and devices to accomplish ends. Operation involves running the mechanisms set up by organization. Administration, if broadly conceived, would include both of these as well as policy formation. So conceived it might be used as synonymous with "control."[45]

From the definitions given it becomes evident that administration is a conglomerate subject and task composed of many parts. Administration properly should be regarded as a synthetic and coordinative science made up of many and various narrower fields of knowledge and experience, and its chief problem as that of integrating and controlling its subfunctions. So far most authors would seem to agree; the differences arise in determining just what these subfunctions are. To define and correlate them thoroughly would take the present study too far afield; however, it will be instructive to study the following list of abbreviated definitions that have been selected at random from various sources. In each definition, administration is regarded as the aggregate of its component subfunctions. Thus several authors hold that:

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[43] Robert W. Burgess, "Research for General Administration," in The Taylor Society, *op. cit.*, p. 43.

[44] Webster Robinson, *Fundamentals of Business Organization* (New York: McGraw-Hill Book Company, Inc., 1925), pp. 36-37.

[45] Leon C. Marshall, *op. cit.*, pp. 1-2.

1. Administration is the equivalent of control.[46]
2. Administration is the equivalent of control plus direction.[47]
3. Administration is the equivalent of control plus coordination plus policies.[48]
4. Administration is the equivalent of control plus organization plus coordination plus policies plus public contacts.[49]
5. Administration is the equivalent of control plus organization plus coordination plus plans plus command.[50]
6. Administration is the equivalent of operation plus organization plus policies.[51]
7. Administration is the equivalent of procedure plus organization plus policies.[52]
8. Administration is the equivalent of management plus organization plus policies.[53]
9. Administration is the equivalent of management plus engineering.[54]

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[46] *Ibid.*

[47] James O. McKinsey, *Business Administration* (Cincinnati: South-Western Publishing Company, 1924), p. 12.

[48] Oliver Sheldon, *loc. cit.*

[49] Thomas R. Jones, *op. cit.*, p. 10.

[50] Henri Fayol, *Industrial and General Administration* (London: Sir Isaac Pitman and Sons, Ltd., 1930), p. 9.

[51] Leon C. Marshall, *op. cit.*, p. 2.

[52] James O. McKinsey, *loc. cit.*

[53] Leon C. Marshall, *op. cit.*, p. 3.

[54] *Vide infra*, p. 15.

10. Administration is the equivalent of execution plus planning.[55]

11. Administration is the equivalent of executive plus staff functions.[56]

12. Administration is the equivalent of executive plus judicial functions.[57]

At first glance such a list of definitions might make the problem seem even more hopeless of solution, yet it must be remembered that words have connotations as well as denotations, and that the performance of one function implies the performance of all other functions necessary to the first. For instance, could there be control of a group activity without direction or without coordination? Is it not the purpose of a policy to direct? Is not organizing largely a matter of coordinating? If so, many apparent differences may, after all, be only a difference of words. And, concerning such differences, Willis Wissler complains as follows: "Few things can be more humiliating to witness than ordinarily sane and estimable citizens rending each other's throats under the misapprehension that their difference of opinion is something other than a lack of agreement as to the meaning of terms under dispute."[58] For present purposes, administration may be taken to mean the control and coordination of an independent or semi-independent operating unit in productive activity, including all phases of its many subdivisions such as legal, financial, technological, commercial, and psychological or sociological. Before further refining its meaning, however, the term "management" must be explained.

DEFINITIONS: MANAGEMENT

"Few people in or out of business would admit that they do not understand what managing means."[59] According to Lansburgh: "Management is a broad term and covers almost all the factors in the operation of an enterprise."[60] This, however, is more nearly our definition of administration; to management has been given a somewhat smaller sphere of activities. According to Sheldon: "*Management* proper is the function in industry concerned in the execution of policy, within the limits set up by administration, and the employment of the organization for the particular objects set before it."[61] According to Church: "Management is the science of applied human effort, just as chemistry is the science of applied chemical properties of elements and their compounds."[62] And according to Webb: "Management is involved in the avoidance of any waste of human effort."[63] Finally, the definition formulated and adopted by the American Society of Mechanical Engineers reads: "Management is the art and science of organizing, preparing and directing human effort applied to control the forces and utilize the materials of nature for the benefit of mankind."[64]

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[55] A twofold division of administrative activities according to many.

[56] *Cf.* line and staff functions, Chap. V, *infra.*

[57] Webster Robinson, *loc. cit.*

[58] Willis Wissler, *Business Administration* (New York: McGraw-Hill Book Company, Inc., 1931), p. 73.

[59] Herbert G. Stockwell, *Introduction to Business Management* (New York: Harper and Brothers, 1929), p. 47.

The essential characteristic of management is that it is concerned with the application of human effort. In management the emphasis is—excusing the pun—on the first syllable, man. Management executes the policies and orders of administration, but in so doing it does more than merely obey orders or transmit instructions to the operators; it employs its own methods and techniques in accomplishing the desired objective. In administration, man is impersonal—an agent of production. In organization he is static; in management he is both personal and dynamic. The function of personnel is concerned with man in his entirety, in all his attributes and activities; its object is to procure, develop, and maintain the worker and thereby facilitate management. Management is concerned with man only in his work or as a worker; its object is to get work done.

Management is not directly concerned with technology and mechanisms. This is the concern chiefly of the physical scientist or engineer. "The Engineer is he who by science and by art so adapts and applies the physical properties of matter and so controls and directs the forces which act through them as to serve the use and convenience of man, and to advance his economic and material welfare."[65] As engineering is concerned with matter, management is concerned with man. However, matter is controlled by man, just as man is controlled by management, and management is in turn controlled by administration. Engineering is concerned with engines, with physical work and energy; management is concerned with man, with human effort and ingenuity which directs all physical and machine effort. Management, therefore, is by no means narrow in its scope, for in directing human effort it is vitally interested in all the facilities and devices which help to make human effort more effective.

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[60] Richard H. Lansburgh, *Industrial Management* (2nd ed.; New York: John Wiley and Sons, Inc., 1928), p. 4. Reprinted by permission.

[61] Oliver Sheldon, *loc. cit.*

[62] A. Hamilton Church, *The Science and Practice of Management*, p. 282.

[63] Sidney Webb, *The Works Manager To-day* (New York: Longmans, Green and Company, 1918), p. 5.

[64] Adopted by the Management Division of the American Society of Mechanical Engineers in 1921. Quoted by permission from C. C. Balderston, *et al.*, *Management of an Enterprise* (New York: Prentice-Hall, Inc., 1929), p. 4.

It is not meant here to restrict unduly the meanings of these well-understood words. It should be recalled, however, that the majority of words in common usage may be employed in a narrow or restricted sense and also in a large or more general sense. The narrow sense usually follows more closely the generic or root meaning of the word, whereas the meaning in the larger sense may include a whole field of activity or ideology which contains the narrower concept as an essential characteristic. Management is derived from a word meaning "hand"—a human hand, it may be presumed. Management applies today to the handling of anything from a man or an engine to a large industrial corporation. In a narrow sense, an engineer is one who operates an engine, as, for example, the locomotive engineer. In a broader sense, engineering has in recent years become synonymous with planning. One often hears, whatever their meanings may be, such terms as commercial engineering, organization engineering, human engineering, government engineering, and political science engineering.[66]

[65] F. R. Hutton, "The Mechanical Engineer and the Function of the Engineering Society," in *Proceedings of the American Society of Mechanical Engineers*, XXIX (1907), p. 602.

[66] See for example Henry S. Dennison, "The Need for the Development of Political Science Engineering," in Luther Gulick and L. Urwick (editors),

Little is to be gained by quarreling over words, but it would lead to a much clearer understanding in all fields of learning if a conscious attempt were made to restrict the meaning of certain terms rather than to expand them to encroach upon others. In recent years as the professional and executive engineers have extended their field of activities to include human relations and management in general, they have tended to expand the title of engineer to fit their activities, whatever these may be. The broadening of the sphere of concern of all professions is highly commendable; it is only the stretching of titles that leads to confusion.

Regardless of terminology used, it seems desirable to recognize and maintain a distinction between engineering or technology, on the one hand, and management on the other. Too often the planner trained in the techniques of the physical sciences has planned for the human factor in his scheme in the same way that he has planned for the material or physical factors. And, consequently, too often have his best-laid plans gone wrong. For some purposes it may be feasible to regard man or labor as a machine, or a cog in the wheel, and represent his activities by definite quantities or limits. Experienced managers, personnel workers, and others who have dealt with the labor problem know that this policy has its limitations. The whole scheme of scientific management has been often challenged because of this tendency, and it must continue to be until this weakness is corrected.

The chief concern so far has been with management as a function; however, it is frequently referred to as an art: "Being the exercise of a special human faculty, moreover, management is an art."[67] But to say that management is an art does not preclude there being a science of it, for every art should be based upon one or more supplementary sciences. In fact, the expression, "the art and science of management," is perhaps most often used in management literature. The same may be used to describe surgery or music. There may be a science of management just as there may be a science of music based upon the principles and laws of

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Papers on the Science of Administration (New York: Institute of Public Administration, Columbia University, 1937), pp. 133 ff.

[67] Oliver Sheldon, *op. cit.*, p. 33.

physics, harmonics, and perhaps phonetics and aesthetics. It is with analogous aspects of management that the science of management is concerned; it is in this way that it is cognate with the science of organization, and that scientific management includes the science of organization.

There is not only a science of management, and an art of management, but also a profession of management, which makes use of both the art and the science. As Sheldon further observes: "The essential feature of the new management is that it is becoming a profession."[68] Regarded in this way it may be classed along with other professions such as law, accounting, surgery, or engineering. And, as engineering may be subdivided into civil, electrical, mechanical, etc., management may be subdivided and designated as sales, production, office or personnel management, etc. Indeed, it may be misleading to speak of it as a single profession, for the all-round manager is becoming about as obsolete under modern industrial conditions as is the all-round surgeon or engineer.

DEFINITIONS: DISTINCTIONS

The chief problem of the lexicographers in distinguishing between administration, organization, engineering, and management has been to draw hairline divisions between the spheres of knowledge and activity of the respective fields. Sheldon's distinctions are classic for their definiteness:

> Organization is the formation of an effective machine; management, of an effective executive; administration, of an effective direction. Administration determines the organization; management uses it. Administration defines the goal; management strives toward it. Organization is the machine of management in its achievement of the ends determined by administration.[69]

Exception to such clear-cut distinctions, however, is taken by Dr. Person, who says:

> In the passage from Sheldon cited in an earlier lecture, organization was characterized as the tool of manage-

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[68] *Ibid.*, p. 46. See also Louis D. Brandeis, *Business: A Profession.*

[69] *Ibid.*, p. 32.

> ment given it by administration. I cannot see it as a separate thing like that; to me organization is a system of relationships of which administration and management are a part; a system of relationships between things to be done, means of doing the things to be done, and the doing persons.[70]

This confusion can be cleared up by regarding organization as a tool or machine of administration rather than of management,[71] and system as the tool or machine of management.[72] As Brisco distinguishes these terms: "Organization consists of individuals; system consists of ways and means."[73] Regarding it another way, ". . . *organization* may be spoken of as the building and developing element, the structural element; and *management* as the directing, controlling, and coördinating element."[74] However, the drawing of hairline distinctions between these terms will probably remain somewhat of a puzzle, for the different terms are all descriptive of the same object; it is only the point of view that is different in each case, and the view from one angle necessarily shades off into that from another. "Routine management shades off into responsible management and organization; organization shades off into policy formation; administration includes all of them. . . ."[75]

Other definitions and distinctions, however, are more difficult to reconcile with those given. As examples, to wit: "Organization is the art of applying resources effectively to the accomplishment of a purpose."[76] Administration is the art of handling men.[77] "Management is the direction of means and methods toward the accomplishment of a given objective. There may be both administrative and executive management."[78] "Let us consider first and broadly the problem of management. This subject may be considered under three heads: organization, system, administration."[79] "Administration is the routine work of the organization in operating the management mechanism or system."[80] "System is the mechanism whereby organization performs its functions of administration. Administration is the dynamics of organization."[81] "Organization is to the other Principles of Management as the steering-wheel, the throttle and spark controls, clutch pedal, the motor-starter, the gear-shift and the brakes are to the rest of the automobile. . . . It is through organization that the manager controls the plant."[82] And so on, *ad nauseam*.

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[70] Harlow S. Person, "Major Problems of Management," in Henry C. Metcalf (ed.), *op. cit.*, p. 237.

[71] See Henry H. Farquhar, "Functional Organization," in The Taylor Society, *op. cit.*, p. 138.

[72] See J. E. Otterson, "Executive and Administrative Organization," in Daniel Bloomfield (ed.), *The Modern Executive* (New York: The H. W. Wilson Company, 1924), p. 43.

[73] From Norris A. Brisco, *Economics of Business* (1920), p. 80. By permission of The Macmillan Company, publishers.

[74] From Cornell and MacDonald's *Fundamentals of Business Organization and Management*, pp. 73-74. Copyright. Used by permission of American Book Company, publishers.

[75] Leon C. Marshall, *op. cit.*, p. 3.

[76] Henry P. Dutton, *op. cit.*, p. 1.

[77] See Henri Fayol, *op. cit.*, pp. 19, 81.

Finally, it should be emphasized that administration, management, and organization after all refer only to different aspects of a single problem, and that in many instances what may be said of the one applies equally to the others. As previously shown, management is often defined so as to include both administration and organization. Its meaning is such in scientific management, and such usage is duly recognized in spite of the more limited scope given the term above. When each of these terms is used in its restricted sense, however, organization refers to the structural relationships of the units of work and of effort to one another and to the whole, management refers not particularly to structure but to the utilization and application of effort in order to accomplish work, and administration including essentially both organization and management relates to the direction and control of the productive unit in all its activities, both internal and external.

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[78] Thomas R. Jones, *op. cit.*, p. 11.

[79] J. E. Otterson, "Executive and Administrative Organization," in Daniel Bloomfield (ed.), *The Modern Executive* (1924), p. 43. Used by permission of The H. W. Wilson Company, publishers.

[80] *Ibid.*

[81] C. Bertrand Thompson, *The Theory and Practice of Scientific Management* (Boston: Houghton Mifflin Company, 1917), p. 4.

[82] G. H. Shepard, *The Elements of Industrial Engineering* (Boston: Ginn and Company, 1928), p. 208.

PRODUCTION ORGANIZATION

Owing to the evident confusion in terminology in this field it may be helpful to define several terms often associated with "organization." The subject of organization, taken in its entirety, is of course a huge subject and much too extensive in scope to receive adequate treatment in a single monograph. As Brisco observes: "The history of life on earth is simply a growth of a more perfect organization. . . ."[83] Of course, as students of administration and organization readily understand, it is with only certain aspects of organization that their field is particularly concerned even though no limiting modifier is inserted. To the student of economics, however, certain limitations should be proscribed, for this term is used in many ways and to include many dissimilar phenomena.

The term "business organization," for example, has come to have a sinister meaning to many, which unsuits it for the purpose at hand. According to the courts: "A business corporation is organized and carried on primarily for the profit of the stockholders. The powers of the directors are to be employed for that end."[84] Likewise, the term "entrepreneur" may be understood to refer only to profit making by risk taking, which also fails to emphasize the efficient production of economic goods and services. The scope of the present study includes only the internal relationships that facilitate "efficient management," whether the operating unit is owned and controlled by entrepreneurs, capitalists, consumers, producers, labor, or the state. As asserted by Major Urwick: "The research worker in management has therefore little concern with the popular distinction which discriminates between organizations on the ground of the objective which they are designed to serve or the particular form of ownership."[85]

[83] Norris A. Brisco, *Economics of Business* (1920), p. 75. By permission of The Macmillan Company, publishers.

[84] From *Dodge v. Ford Motor Company,* 204 Mich. 459, 170 N. W. 668, in Nathan Isaacs, *The Law in Business Problems* (revised ed., 1934), p. 429. By permission of The Macmillan Company, publishers.

[85] L. Urwick, "The Study of Management: The International Position," in The British Association for the Advancement of Science, *Business and Science* (London: The Sylvan Press, 1931), p. 7.

The term "administrative organization" is often used quite appropriately to denote that aspect of organization with which this study deals. However, since administration is sometimes defined so as to include only the directors and the chief and the major executive officers, and since it has to do with external and ownership relations, as well as internal relations, that term may at times be misleading.

The term "management organization" would be especially suitable as a title were it always understood to include not only the chief and major executives but also the workers of the lowest rank. Management as previously defined involves human effort of all kinds as it is applied to the accomplishment of useful work. Moreover, the literature of management is largely the literature of internal organization; the two subjects are developed side by side, and they must continue so. Nevertheless, management organization may have a more restricted meaning in the minds of some students. Mr. Sorrell, for example, in his discussion states: "The process of specializing management itself may be termed organization of management. . . ."[86]

Instead of "production organization," the subject matter of the present study might be termed "control organization," with adequate justification, for the main purpose of organization is to provide machinery for the control of the personnel in performing the work of the enterprise. The latter is not used, however, because control has also come to have a rather limited meaning with some authors. For example: "Control is that fundamental of organization which comprises the means of providing the manager and executives of an organization with continuous, prompt, and accurate information concerning the efficiency of operation, what the business is doing, what it has done in the past, and what it can be expected to do in the future."[87] It is used in this sense in "production control." Dutton lists control as one of the four functions of production and, in turn, divides it into the subfunctions of planning, supervision, inspection, and information.[88] "Control organization" might therefore

[86] Lewis C. Sorrell's discussion, in Thomas R. Jones, *op. cit.*, p. 43.

[87] Webster Robinson, *op. cit.*, p. 147.

[88] See Henry P. Dutton, *Factory Management* (New York: The Macmillan Company, 1924), pp. 5-7.

be confused with the system or mechanisms for obtaining control of operations such as a perpetual inventory for stores control, a budget for expense control, scheduling for time control, accounting for cost control, inspection for quality control, etc.

The term "scientific organization" perhaps needs no explanation to students of the social sciences. Such students understand that social phenomena of any kind may be attacked by the scientific method—the method of fact finding, analyzing, measuring, testing, summarizing, and of deducing principles and laws from the systematized facts. They are also aware that the laws of the social sciences are only statements of tendencies,[89] and they understand the importance and the application of the concepts of averages, of a normal distribution, and of probable error. The science of organization and management is a social science created and developed by the same method, and subject to the same limitations, as the other sciences dealing with social phenomena. It differs from most of the other sciences in that it is newer and still struggling to clarify and purify its own premises.

Organization and management as a sceince has grown and developed at a comparatively rapid rate when consideration is taken of its environment and its many handicaps. In the first place, from the scientific point of view, it suffered the misfortune of being practical, or workable, and therefore profitable, from the start. Thus whereas many who were concerned in the welfare and betterment of mankind conservatively hesitated even to subscribe to its tenets, the less cautious seized upon certain of its mechanisms to enrich themselves and sometimes to maltreat and abuse mankind. The science has also suffered greatly from charlatans, pseudo-scientists, and "efficiency experts" who have flaunted the name of scientific management and applied some of its technique without regarding its true principles. Moreover, it has often encountered the vested interests of employers, of labor-union officials, and of persons having competing practices or theories. Finally, it must be remembered that the course of every new science or philosophy is bestrewn with errors, mistakes, false starts, and false prophets. The science of economics needed much amplification and refinement after Adam Smith completed his work, and it is not to be expected that the science of management and organization should have sprung from the mind of F. W. Taylor full grown.

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[89] See Alfred Marshall, *Elements of Economics of Industry* (New York: The Macmillan Company, 1920), Chap. IV, "Economic Laws."

With the subject of organization thus defined and differentiated from other, related subjects, and thus limited in scope, its more accurate comprehension is made possible. It may be noted, of course, that, by abstracting any subject from the whole field of activities of which it is a part, any treatment of that subject is naturally unreal and to some extent artificial. Such unreality or artificiality, however, cannot be entirely avoided, because it is necessary to divide any large subject into its various parts or aspects and study each separately for purposes of further analysis and exposition. Accordingly, in order to understand the nature and the significance of the organizational aspect of industry, other aspects such as the managerial, the psychological, etc., must be held as known or constant, or, as it were, held in suspense, while full attention is focused on this one aspect.

Summary Outline

In conclusion, the plan of procedure of the study of production organization may be outlined somewhat as follows:

(1) The delimitation, description, and definition of the subject, as presented above in the present chapter.

(2) The origin, the evolution, and the importance of the fundamental elements of the science of organization and the relation of organization and management to production and economics.

(3) The organization of work—the work to be accomplished by the enterprise. Account is here taken of the productive factors, or ingredients of work, of the various units of work, and of the synthesis of the various ingredients and units in constructing the system of work.

(4) Organization structure, which is concerned with the

nature of human work or effort, and with the manner of combining various units of human effort to constitute departments, functions, etc.

(5) A consideration of the methods of controlling human effort by defining and differentiating the various types of control, the so-called types of organization structure.

(6) An examination of the situations in which each of the main types of control may be successfully utilized and a comparison of the relative advantages and disadvantages inherent in each type.

(7) The principles and the laws or rules prevailing in organization construction.

(8) The broader applications of scientific organization, and its relationship to the principles of scientific management, industrial democracy, integration, and rationalization.

CHAPTER II

ENVIRONMENT AND EVOLUTION OF THE THEORY OF ORGANIZATION

ENVIRONMENT

Before proceeding into the details and mechanics of organization, brief mention should be made of the background and general setting of the subject. Production organization is, it is believed, a science within itself, but this does not prevent its being included within the scope of other, more extensive fields of knowledge, as, for instance, economics, political science, or sociology. The proper relationship of the sciences of economics and organization is explained by Black and Black as follows:

> The utilization of human and natural resources also involves a large number of simple matters of combination and fitting together of these resources in such a way that they function to best advantage. . . .
>
> Taken together, this latter group of problems, along with other similar and related ones, constitute what is often called the *science of organization*, or sometimes organization and administration. This has at times been set up as a science separate from economics; at times called the science of business; at times attached to engineering; and at still other times attached to sociology. In its applied phases, it has very wide connections. Its principles are basic to the problem of organizing all kinds of undertakings, not only industrial, commercial, and financial, but educational, governmental, political, and even religious and military. For two reasons, organization and administration are here considered as part of economics; first, because they represent economizing or utilizing resources to best advantage; and second, because they frequently involve value and price considerations. . . .[1]

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[1] **John D. Black and Albert G. Black, *Production Organization* (New York: Henry Holt and Company, 1929), pp. 5, 6.**

Economics is essentially a study of value and price, and it is largely concerned with the utilizing of human and natural resources, but, "in the last analysis it is always human effort in one form or another that is economized."[2] Remembering that management has been defined as the "science of applied human effort,"[3] and that organization is chiefly concerned in combining units of human effort, it is seen that economics and organization have at least one important factor in common, human effort. It is, then, human effort, or labor, that forms the essential connecting link between this field and economics, and it is a main purpose of this chapter to examine briefly the concern of each of the two sciences in analyzing this particular factor.

The fields of economics, management, and organization are correlated also in a larger way. According to a broader definition: "Management may be defined as the art [and the science] of applying the economic principles that underlie the enterprise under consideration. It makes itself manifest through organization . . ."[4] The case may be made even clearer by regarding administration, organization, and management as problems of production, and therefore of production economics. Production is usually defined as "the creation of utilities," a definition that is capable of being expanded in several directions. According to Professor White, "The process of producing goods may be viewed in three ways: subjectively as a means of satisfying wants; industrially as a process of making goods; and to the business man as a means of making profits."[5] These definitions are concerned in every case with the nature of the product, or what comes out of the process of production. It may be equally correct, and perhaps more suggestive, to define production in terms of the input, or what goes into the process. From such a standpoint, production may be defined as the process of combining the factors of production, the utilizing of natural and human resources, or merely as the application of useful effort. It is when production is defined in this manner that it is seen to be inclusive of the field of organization and management.

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[2] John D. Black, *Introduction to Production Economics* (New York: Henry Holt and Company, 1926), p. 4.

[3] A. Hamilton Church, *The Science and Practice of Management,* p. 282.

[4] Dexter S. Kimball, *Principles of Industrial Organization* (3d ed.; New York: McGraw-Hill Book Company, Inc., 1925), p. 411.

[5] Percival White, *Business Management: An Introduction to Business* (New York: Henry Holt and Company, 1926), p. 44.

Although it is clear that the science of management, including organization in this respect, is a subdivision of production economics, it did not originate as a science at the hands of professed economists. The chief contributors to the science in its beginnings were technologists, industrialists, and engineers. In fact, the first important scientific treatises in the field were read before the American Society of Mechanical Engineers. This society, however, later hesitated to sponsor the new science,[6] for it was recognized that management was not particularly an engineer's problem. As production has become more and more mechanistic the engineer has come to play an ever-increasing part in the productive process, but, however mechanical the process may be, it must be made to work by man. Engineering has merely furnished the scientific methodology and the mechanisms with which management has attacked its problems; but, this having been done, the two sciences remain separate and distinct only to be united in an industrial establishment by administration.

Since it is man or human nature that is the chief concern of management, it would seem, therefore, that psychology might have been the basic science out of which the new science of management sprang. Such indeed would have been a logical evolutionary development; but as it happened the psychologists did not come into the movement until after it was well under way, and for a long time thereafter they proved to be weak contributors.[7] Within more recent years, however, psychology and especially psychiatry and technopsychology have made valuable contributions, and from all indications they are destined to play a larger, if not a leading, role in the future of management and organization.[8]

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[6] See Frank B. Copley, *Frederick W. Taylor: Father of Scientific Management*, Vol. II (New York: Harper and Brothers, 1923), p. 383.

[7] See A. M. Simons, *Personnel Relations in Industry* (New York: The Ronald Press Company, 1921), p. 34.

[8] See for example H. J. Welch and G. H. Miles, *Industrial Psychology in Practice* (London: Sir Isaac Pitman and Sons, 1932), and V. V. Anderson, *Psychiatry in Industry* (New York: Harper and Brothers, 1929).

Scientific management, including organization, it is understood, has then taken its methodology from the natural sciences and more directly from engineering; it is being furnished with valuable data by psychology; and its technique has been acquired first from engineers but more recently from psychologists, psychiatrists, physicians, and educators. For its objectives and its philosophy, however, management looks to economics.[9] Neither its engineering methodology, its psychological data, nor its professional technique is sufficient to divorce it from the field of production economics which supplies its purposes, its rationale, and its environment. The science of management should be regarded as a division of production economics extended further into its details and particulars. It is concerned with the mechanisms and institutions through which economic laws operate. Both economic laws and management laws and mechanisms must be analyzed and studied together before either can be fully understood.

That management looks to economics for its objectives and its rationale is by no means a new thesis; it has been true from the beginning, although infrequently recognized. Adam Smith, the founder of the science of economics, and F. W. Taylor, the founder of scientific management, introduced their chief works with much the same thought in mind.

Adam Smith began his *Inquiry into the Cause and Nature of the Wealth of Nations* with the following introductory sentences:

> The annual labour of every nation is the fund which originally supplies it with all the necessaries and conveniences of life which it annually consumes, and which consists always either in the immediate produce of that labour, or in what is purchased with that produce from other nations.
>
> According therefore as this produce, or what is purchased with it, bears a greater or smaller proportion to the number of those who are to consume it, the nation will be better or worse supplied with all the necessaries and conveniences for which it has occasion.

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[9] See statements of purposes: *The Society for the Advancement of Management Journal, passim.*

division of labor is "the most important economic influence, perhaps, in civilization."[17]

The paths of inquiry did not diverge, however, immediately after these introductory statements of general principles; each author proceeded in truly scientific fashion to analyze labor or human effort and to submit it to some sort of measurement. It is the progress of this analysis and this search for an elemental unit of labor that marks the course of the evolution of scientific management and organization. Such an evolution may be traced as follows: (1) Adam Smith, (2) Smith's followers, (3) F. W. Taylor, (4) Taylor's followers, and (5) the economic philosophy of scientific management.

Adam Smith

Smith's interest in analyzing human effort and reducing it to measurable terms is indicated by the following:

> But though labour be the real measure of the exchangeable value of all commodities, it is not that by which their value is commonly estimated. It is often difficult to ascertain the proportion between two different quantities of labour. The time spent in two different sorts of work will not always alone determine this proportion. The different degrees of hardship endured, and of ingenuity exercised, must likewise be taken into account. There may be more labour in an hour's hard work than in two hours' easy business; or in an hour's application to a trade which it cost ten years' labour to learn, than in a month's industry at an ordinary and obvious employment. But it is not easy to find any accurate measure either of hardship or ingenuity. In exchanging, indeed, the different productions of different sorts of labour for one another, some allowance is commonly made for both. It is adjusted, however, not by any accurate measure, but by the higgling and bargaining of the market, according to that sort of rough equality which, though not exact, is sufficient for carrying on the business of common life.[18]

Smith was here concerned chiefly, of course, with developing his labor theory of value, which though now considered to be only a relic of the past by most economists continues to receive attention by some of our leading thinkers as furnishing the ideal unit of value.[19] According to Professor Dutton: "Labor would be a much more accurate measure of value from the human standpoint [than gold], were it only possible to evaluate an hour of one man's labor in terms of the hour's work of another man. Even this might be possible were we dealing with physical labor only. . . ."[20]

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[17] *Ibid.*, p. 20.

[18] Adam Smith, *op. cit.*, p. 27.

It is not, however, with Smith's theory of value or his unit of value that we are here so much concerned, but rather with his analysis of the elements of labor and his attempt to reduce human effort to measurable terms. Before Smith, Petty had attempted to measure the value of labor by equating it with the product of a definite area of land;[21] and Cantillon had attempted to account for wage differentials by counting the differences in the cost of production and maintenance of the workers in the different occupations.[22] Their treatment, however, was hardly even suggestive of Smith's chief interest, for Smith wanted to measure labor from a shorter-run point of view and determine the factors that went into the performance of each job. He noted that training, hardship, and ingenuity were factors which determined the relative value of labor in different employments, and he no doubt wished to submit these factors to measurement and to derive a unit for measuring his "use value." However, he quite soon realized that "it is not easy to find any accurate measure of hardship or ingenuity,"[23] and readily gave up the entire problem of measuring the amount of labor that went into a day's work, stating that it was adequately measured "by the higgling and bargaining of the market, according to that sort of rough equality which, though not exact, is sufficient for carrying on the business of common life."[24] It is at just this point that Smith abandoned the field of inquiry in which management is most concerned. He first raised the point, but he did not solve the problem; he made haste to adopt exchange value as the only workable measure in his system. Moreover, he did not tarry long in the field of production, but devoted the greater part of his treatise to exchange, distribution, and public finance, a course in which he has been followed by the majority of economists.

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[19] See for example: E. M. Bernstein, *Money and the Economic System* (Chapel Hill: University of North Carolina Press, 1935), pp. 426-428.

[20] Henry P. Dutton, *Principles of Organization* (New York: McGraw-Hill Book Company, Inc., 1931), p. 72.

[21] See Sir William Petty, "A Treatise of Taxes and Contributions," in Arthur E. Monroe (ed.), *Early Economic Thought* (Cambridge: Harvard University Press, 1924), pp. 218-219.

[22] See Richard Cantillon, "On the Nature of Commerce in General," in Arthur E. Monroe (ed.), *ibid.*, pp. 247-277.

[23] Adam Smith, *op. cit.*, p. 27.

THE FOLLOWERS OF ADAM SMITH

Adam Smith's immediate followers were nowhere concerned in analyzing or measuring human effort; exchange-value was quite universally accepted as the basis of economic reasoning, and the subject of use-value remained a minor question. Ricardo's labor cost theory of value was concerned entirely with the labor value of products, not with the elemental constituents of labor itself. The subsistence theory of wages adequately accounted for general wage levels, and it seems there was little interest among the economists in determining the particular wage of an individual worker. Carver's criticism of beginners in economics is descriptive of the early economists. "It is a prevailing vice of beginners in economics," says he, "to be always trying to explain the value of things-in-general before they have adequately explained the value of particular articles."[25] Under this treatment labor was regarded as being little different from an article of commerce and its compensation adequately explained by the general formula: "Wages are determined by the discounted marginal product of labor."[26] The chief interest of the economists centered in the field of distribution; there seemed to be little to be explained in the field of production, for the general laws of diminishing returns or productivity seemed to be entirely sufficient. According to Ely: "Perhaps the most fundamental truths in connection with production are those arising from the universal economic phenomenon generally described as 'the law of diminishing returns.' "[27]

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[24] *Ibid.*

[25] From Thomas N. Carver, *The Distribution of Wealth* (1924), p. 4. By permission of The Macmillan Company, publishers.

[26] John R. Turner, *Introduction to Economics* (New York: Charles Scribner's Sons, 1919), p. 465.

Even though this general law of production economics is a fundamental truth, it has been of little help to the industrial manager in applying human effort under modern industrial conditions, because such a mechanical formula makes no allowance for either the organic nature of a properly organized "going concern" or the changeable and dynamic nature of a human being. As Professor Black has explained: "If we could assume that an individual's effort was a fixed amount, the problem could be solved by assuming the individual as fixed, and applying increasing amounts of the other elements—land, labor, equipment, etc.—to him."[28] He notes, however: ". . . that none of us has a definite amount of inducement which he requires for a given amount of effort, that the effectiveness of our effort varies tremendously from day to day, and that our reluctance to put forth is uncertain and varying."[29] Although Professor Black offers a thesis for this sort of analysis, he points out its many shortcomings.[30]

Not until we come to the marginal utility group do we find economists who attempt to analyze and measure human effort. Clark, for instance, was particularly concerned with the problem in his theory of subjective value. He may be quoted to show that he seemed to start out in the right direction, but that he soon dodged our real problem. He says: "The entire study of wealth is, indeed, meaningless unless there be a unit for measuring it; for the questions to be answered are quantitative."[31] In his attempt to estimate pleasure in terms of pain, he continues:

> Work, moreover, consists of concrete acts of men; and these are as unlike in themselves as are the miscellaneous articles that are to be measured by them. Can we make one sum of the labor involved in cutting wood, in playing

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[27] From Richard T. Ely, *et al.*, *Outlines of Economics* (5th revised ed., 1931), p. 118. By permission of The Macmillan Company, publishers.

[28] John D. Black, *op. cit.*, p. 454.

[29] *Ibid.*

[30] See *Ibid.*, pp. 455 ff.

[31] From John B. Clark, *The Distribution of Wealth* (1914), p. 375. By permission of The Macmillan Company, publishers.

> violins, in setting type, etc.? Adding the unlike acts that constitute social labor, is, it appears, as difficult as adding the products that constitute social wealth. There is need of a pervasive element in the actions, and one that can be measured. Such an element can be found; for, as utility is common to all commodities, so personal sacrifice is common to all varieties of labor.[32]

Quite soon, however, Clark concludes that, "It is not necessary that individual laborers should be tested in a way that would measure in any kind of scientific units the work that they perform."[33] It is this statement of Clark's that again marks the limit and extent of economic research into the particulars of production, for if there is ever to be a real science of human labor it is quite "necessary that laborers should be tested in a way that would measure in some kind of scientific units the work they perform."

It is, perhaps, only Jevons who supplies a connecting link between classical economics and the fundamental elements of scientific management. Charles Babbage, of course, foreshadowed much of modern production economics. His contribution to the explanation and development of the principle of the division of labor, and his emphasis upon drawing and planning, are well recognized.[34] He may also be considered a forerunner of present-day fatigue study. His interest in fatigue and some of its causes is duly recognized by Jevons, who quotes him at some length.[35]

Jevons, however, attacks the problem in a more scientific manner, and his analysis penetrates nearer to the heart of the problem, as the following statements indicate:

> Hence amount of labour will be a quantity of two dimensions, the product of intensity and time when the intensity is uniform, or the sum represented by the area of a curve when the intensity is variable.
>
> But intensity of labour may have more than one mean-

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[32] From John B. Clark, *The Distribution of Wealth*, pp. 381-382. By permission of The Macmillan Company, publishers.

[33] From John B. Clark, *The Distribution of Wealth*, p. 398. By permission of The Macmillan Company, publishers.

[34] See *Majority Report of the Sub-Committee on Administration of the American Society of Mechanical Engineers*, 1912.

[35] See W. S. Jevons, *The Theory of Political Economy* (4th ed., 1911), p. 206.

> ing; it may mean the quantity of work done, or the painfulness of the effort of doing it. These two things must be carefully distinguished, and both are of great importance for the theory. The one is the reward, the other the penalty, of labour.[36]

He explains these terms further on as follows:

> We may approximately measure the intensity of labour by the amount of physical force undergone in a certain time, although it is the pain attending that exertion of force which is the all-important element in Economics. Interesting laws have been or may be detected connecting the amount of work done with the intensity of labour. Even where these laws have not been ascertained, long experience has led men, by a sort of unconscious process of experimentation and inductive reasoning, to select that rate of work which is most advantageous.[37]
>
> It occurred to me, sometime since, that this was a subject admitting of interesting inquiry, and I tried to determine, by several series of experiments, the relation between the amount of work done by certain muscles and the rate of fatigue. . . . I undertook these experiments as a mere illustration of the mode in which some of the laws forming the physical basis of Economics might be ascertained.[38]

And he adds: "The Economics of Labour will constantly involve questions of this kind."[39]

As before stated, economics defines production in terms of its output or product, while management defines it in terms of the input or effort. It is clear that Jevons has in mind both points of view, as he expresses it: "the reward and the penalty of labour." Moreover, he was interested in laws "connecting the amount of work done with the intensity of labour," and he even conducted a series of experiments to determine "the relation between the amount of work done by certain muscles and the rate of fatigue," in order to illustrate, as he says, "the mode in which some of the laws forming the physical basis of Economics might be ascertained."[40] Clark's sacrifice of labor, it seems, was essentially a function of time, for he says: "Work becomes more costly to the man who performs it, as the hours of the day succeed each other."[41] Jevons's penalty of labor is a "quantity of two dimensions, the product of intensity and time," and his intensity, as it seems to be, is essentially a matter of fatigue, which, it may be noted, does increase with time. Thus, in analyzing human effort, Jevons was considerably in advance of other economists and should be regarded as a forerunner of Taylor and the scientific management group, although Taylor makes no reference to the work of either Jevons or Babbage, or, in fact, of any economist.

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[36] From W. S. Jevons, *The Theory of Political Economy*, p. 170. By permission of The Macmillan Company, publishers.

[37] From W. S. Jevons, *The Theory of Political Economy*, p. 204. By permission of The Macmillan Company, publishers.

[38] From W. S. Jevons, *The Theory of Political Economy*, p. 207. By permission of The Macmillan Company, publishers.

[39] From W. S. Jevons, *The Theory of Political Economy*, p. 209. By permission of The Macmillan Company, publishers.

FREDERICK W. TAYLOR

With the work of Taylor, production economics received a new foundation. The "sort of unconscious process of experimentation and inductive reasoning" which marked the extent of Jevons's analysis had to be replaced by a very conscious process of experimentation and reasoning. Taylor attempted to break down each manual art or trade into elemental motions which could be accurately timed, described, and taught to anyone. Taylor's own words may show, first, this main problem, and, second, the importance he attached to it.

As to his main object, he says: "One of the important objects of this paper is to convince its readers that every single act of every workman can be reduced to a science."[42] The importance he attached to this work is shown in the following statement: "In preparation for this system the writer realized that the greatest obstacle to harmonious cooperation between the workmen and the management lay in the ignorance of the management as to what really constitutes a proper day's work for a workman."[43] In discussing his motion and time study, he explains further his problem and its solution:

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[40] From W. S. Jevons, *The Theory of Political Economy*, p. 204. By permission of The Macmillan Company, publishers.

[41] From John B. Clark, *The Distribution of Wealth*, p. 382. By permission of The Macmillan Company, publishers.

[42] F. W. Taylor, *The Principles of Scientific Management* (New York: Harper and Brothers, 1911), p. 64.

> To explain briefly: owing to the fact that the workmen in all of our trades have been taught the details of their work by observation of those immediately around them, there are many different ways in common use for doing the same thing, perhaps forty, fifty, or a hundred ways of doing each act in each trade, and for the same reason there is a great variety in the implements used for each class of work. Now, among the various methods and implements used in each element of each trade there is always one method and one implement which is quicker and better than any of the rest. And this one best method and best implement can only be discovered or developed through a scientific study and analysis of all the methods and implements in use, together with accurate, minute, motion and time study. This involves the gradual substitution of science for rule of thumb throughout the mechanic arts.[44]

Taylor again states quite definitely the importance of this work to his system:[45]

> In a book of this sort, it would be manifestly impossible to discuss at length all of the details which go toward making the system a success. Some of them are of such importance as to render at least a brief reference to them necessary. And first among these comes the study of unit times.
>
> This, as already explained, is the most important element of the system advocated by the writer. Without it, the definite, clear-cut directions given to the workmen, and the assigning of a full, yet just, daily task, with its

[43] *Ibid.*, p. 53.

[44] *Ibid.*, pp. 24-25.

[45] See also: "The writer asserts as a general principle (and he proposes to give illustrations tending to prove the fact later in this paper) that in almost all of the mechanic arts the science which underlies each act of each workman is so great and amounts to so much that the workman who is best suited to actually doing the work is incapable of fully understanding this science, without the guidance and help of those who are working with him or over him, either through lack of education or through insufficient mental capacity." *Ibid.*, pp. 25-26.

premium for success, would be impossible; and the arch without the keystone would fall to the ground.[46]

It should be noticed that Taylor persistently emphasized the idea involved in his first principle: the development of a science for each element of a man's work. It was by no means inconsequential that he stated this principle first, for it is here that he followed the true scientific method in his experiments and research; it is here that he is analytical, and it is this analysis that properly precedes his synthesis. It is here that he tries to dissect human effort in all its various forms and thereby reduce labor to terms capable of being dealt with in a scientific manner.

The importance of this first principle is often overlooked by many commentators on scientific management; many mistake the mechanisms and the system developed by Taylor for the fundamentals of his science.[47] Some have regarded scientific management as merely a body of axioms and mechanisms rather than a body of principles. Nothing is farther from the truth. The mere collection of axioms or the invention of mechanisms is not sufficient alone to mark a man as the founder of a new science. Hoxie saw more clearly the essence of Taylor's system, and he states, in italics, as follows: "*Time and motion study, therefore, must be regarded as the chief cornerstone of scientific management, its main distinguishing feature, and the point of departure for any understanding and judgment of its claims, especially with reference to its scientific character and labor welfare.*"[48]

By time and motion study Taylor attempted to resolve human labor into elementary motions and to relate these motions singly and in groups to unit times, to standards of productivity and costs, and to their effect on the human body and mind. There is nothing scientific in scientific management unless it is based upon an analysis of all that goes into human labor and unless it builds upon the tested and proved facts derived from such an analysis.

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[46] F. W. Taylor, *Shop Management* (New York: Harper and Brothers, 1911), p. 148.

[47] See Archibald H. Church and L. P. Alford, "Regulative Principles of the Art of Management," in Leon C. Marshall, *op. cit.*, p. 820.

[48] R. F. Hoxie, "Scientific Management and Labor Welfare," *The Journal of Political Economy*, XXIV (1916), p. 838.

Taylor sought to collect and codify the factual data so derived and establish thereupon universal laws and principles for each and every task or job in industry. Such an undertaking was of course impossible of realization within the life of one man, but his followers have taken up where he left off and supplied the remaining steps needed for the completion of his system.

TAYLOR'S FOLLOWERS

Taylor's followers have, on the whole, done more to establish management and organization as a science than Taylor did himself. Had he not had associated with him such men as Henry L. Gantt, Carl G. Barth, King Hathaway, and Sanford E. Thompson, and had he not directly influenced such men as Harrington Emerson, Morris L. Cooke, Frank B. Gilbreth, Henry S. Dennison, Harlow S. Person, Henry P. Kendall, and others, it is quite possible that his principles and his analytical work would never have been fully understood or appreciated, and that his inventions and his mechanisms alone would have marked the extent of his contribution. In actual practice, Taylor was much concerned with his devices and his technique, but he saw much farther than he went, and his followers, having caught his vision, have continued to develop and refine his science. Some of his followers have developed one aspect of his system and some another, but the work of all continues to bear out Taylōr's own account that "scientific management at every step has been an evolution, not a theory."[49]

It is, however, with only one feature of Taylor's work that the present summary is particularly concerned, that is, his analysis of human effort, or what is now usually called time and motion study. It is in this feature that his true science has its origin and its essence. Hoxie again states "that time study and task setting are among the most important, if not the most crucial factors of the scheme,"[50] and Drury states that "this alone is enough to form the basis for a system."[51] The importance of time and motion study is being realized more and more by the leaders in the movement, yet it is still a subject of considerable confusion. Mr. Mogensen, writing in 1932, emphasized this fact in the following statement:

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[49] F. W. Taylor, quoted in The Taylor Society, *Scientific Management in American Industry* (New York: Harper and Brothers, 1929), p. 42.

> No phase of scientific management has been so muddled and misunderstood as have time study and motion study. Of course, this may be putting the cart before the horse, as it might well be that through this misunderstanding of time study and all that it means, we have the reason why scientific management has not been more generally accepted and more widely used.
>
> Taylor said many years ago: "Time study is by far the most important element in scientific management." This is perfectly logical because scientific management is simply management that is based upon actual measurements, and of course Taylor realized at the very beginning that time study was one of the most important tools of management. He saw that time study afforded an opportunity—first, to measure work and, second, to measure elementary times which could be used over and over again in building up times for variable operations.[52]

Instead of the term "time and motion study," it would be less confusing in most cases to substitute the more inclusive term "job analysis," for, after all, every aspect of a job must be studied before anything constructive can be undertaken. Barth has said that "time study cannot be separated from motion study";[53] Mrs. Gilbreth remarked that "there is too much study of work that should be eliminated, not studied";[54] and Mr. Gilbreth emphasized the unnecessary fatigue resulting from "needless, ill-directed, and ineffective motions."[55] An analysis of the job should therefore include: time study, motion study, fatigue study, and also the study of costs, machine design and operation, the job environment and conditions, and finally the mental and emotional complexes of the worker.

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[50] R. F. Hoxie, *Scientific Management and Labor* (New York: D. Appleton-Century Company, 1920), p. 54.

[51] Horace B. Drury, *Scientific Management* (2d ed. revised; New York: *Columbia Studies in History, Economics, and Public Law*, 1918), p. 237.

[52] Allan H. Mogensen, *Common Sense Applied to Motion and Time Study* (New York: McGraw-Hill Book Company, Inc., 1932), p. 7.

[53] *Ibid.*, p. 10.

[54] *Ibid.*, p. 13.

In addition to the terms "time and motion study" and "job analysis," still other terms are used to describe this same group of studies, for instance, Anderson uses "operation study,"[56] Lansburgh calls it "job study,"[57] and Dutton refers to it as "operation analysis."[58] Definitions are even more numerous than titles; their chief differences, however, are due usually to the purposes of the study rather than to its fundamental nature or inclusiveness. According to Robinson, job analysis is "a method of scientifically dissecting a job in order to determine the component elements and their influence upon the length of the learning period of the worker, production and labor turnover."[59] With the exception of purposes such a definition does not differ essentially from Gilbreth's definition of motion study, which follows: "Motion study consists of dividing work into the most fundamental elements possible; studying these elements separately and in relation to one another; and from these studied elements, when timed, building methods of least waste."[60] It is apparent, therefore, that time and motion study, or job analysis, is a broad subject with many phases and that no one phase should be entirely divorced from the rest.

The inseparability of the different aspects of job analysis and their fundamental importance to scientific management are especially emphasized here because some of the leaders in the scientific management movement have been confused.

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[55] *Ibid.*, p. 15.

[56] Arthur G. Anderson, *Industrial Engineering and Factory Management* (New York: The Ronald Press Company, copyright 1928), p. 346.

[57] Richard H. Lansburgh, *Industrial Management* (2d ed.; New York: John Wiley and Sons, Inc., 1928), p. 239.

[58] From Henry P. Dutton, *Factory Management* (1924), p. 118. By permission of The Macmillan Company, publishers.

[59] Webster Robinson, *Fundamentals of Business Organization* (New York: McGraw-Hill Book Company, Inc., 1925), p. 97.

[60] From Frank B. and Lillian M. Gilbreth, *Applied Motion Study* (1919), p. 43. By permission of The Macmillan Company, publishers.

Neither Gantt nor Emerson seemed to have fully appreciated the significance of this analytical foundation of the science.[61] Moreover, Frank B. Gilbreth, the greatest analyist among the followers, seems to undervalue the importance of motion study in Taylor's system, as is shown in the last lengthy paper he wrote, in which he stated:

> The literature of scientific management is full of examples where time study and motion study are confused. This confusion abounds even in books that are considered classics. It should be recognized that "Time study is the art of finding how long it takes to do work." This was Taylor's original definition, and it is still good. Time study is the great invention of Dr. Taylor. Taylor never did any Motion Study of any kind whatever. This can be proved by reading Taylor's own writings, and it is also a matter of record in our office. This fact is entirely missed, perhaps unintentionally, by Taylor's biographer, Copley.
>
> The definition of Motion Study is "Motion Study is the science of finding The One Best Way to Do Work."[62]

Gilbreth is, perhaps, literally correct in his contention, for Taylor cited him in reference to motion study, and it is true also that Taylor's emphasis was on time study and task setting; nevertheless, motion study was included as an integral part of Taylor's system of scientific management. According to Mogensen:

> Taylor's work all arose from his desire to find out just what constituted a day's work. Those familiar with the history of his work will recall his exasperation in trying to find out from anyone in the shop just how long it should take to do a job. He therefore set out to discover the answer, and it was natural that time should be the predominating element. Most of his emphasis was upon the time, but one does not have to look far to see that he also very definitely considered the method.[63]

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[61] See R. F. Hoxie, *op. cit.*, pp. 150, 166.

[62] Frank B. Gilbreth, "The Classification of Work," in *Reducing the Cost of Business* (The Society of Industrial Engineers, Vol. VII, No. 1, September, 1924), p. 116.

[63] Allan H. Mogensen, *op. cit.*, p. 9.

And according to Colonel Babcock: "In Taylor's day, time study and motion study were not considered separately; although he sometimes used the term 'motion study,' Taylor usually used the term 'time study' to cover both."[64]

As to the idea of motion study or motion economy, including both time and fatigue study, neither Taylor nor Gilbreth appears to have been the sole originator. As we have seen, both Babbage and Jevons had ideas on the subject of fatigue; Stonewall Jackson made good use of enforced rest periods in marching in his Foot Cavalry; the Army has for a long time made use of a Manual of Arms based upon "the quickest and simplest methods of handling a pistol,"[65] or other instrument; athletic coaches emphasize "form" in every event; and Harrington Emerson has said: "I had made time studies as to a great variety of operations twenty years before I met Mr. Taylor" [in 1900]; and again: "We made motion studies with moving pictures when on the Santa Fe [1904-6] but Mr. Gilbreth has developed this part of the art far beyond our elementary attempts. . . ."[66]

As to the development of motion study and as to the subjection of human motions to definite scientific description and measurement, however, Gilbreth has gone much further than anyone before him ever foresaw. He is the undisputed founder of motion study as a science, for it is he who has finally reduced human effort to its ultimate units. His dissatisfaction with the previously accepted elements of work may be given again, in his own words:

> The literature of scientific management abounds with examples of units of work improperly called "elements," which are in no sense elements.
>
> A classification for finding The One Best Way to Do Work, must deal with *true elements*, not merely with subdivisions that are arbitrarily called "elements. . . ."

There has recently appeared a well-written biography

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[64] George D. Babcock, "Research for Production," in The Taylor Society, *op. cit.*, p. 91.

[65] Col. P. S. Bond *et al.*, *The R.O.T.C. Manual, Senior Course, 2nd Year Advanced* (Baltimore: The Johns Hopkins Press, 1921), p. 7.

[66] Horace B. Drury, *op. cit.*, p. 128.

> of a great engineer[67] in which sub-divisions of operations requiring in many instances more than thirty seconds to perform have been erroneously described as "elements." That error will again mislead many people. These so-called "elements" should be taken for what they really are, namely, sub-divisions and not elements, and not confused with true elements, or fundamental units which cannot be further sub-divided.[68]

Gilbreth's contention this time is entirely correct, for by means of micromotion study—his own invention—he was able to push the analysis of motions much further than Taylor ever contemplated. Whereas Taylor dealt with one-hundredths of a minute as his unit of time, Gilbreth made his measurements in terms of two-thousandths of a minute, a unit which he called a "wink."[69] In other words, Taylor used as his unit of work a group or cycle of motions—a molecule of work; Gilbreth, on the other hand, split the molecule and found it to contain in every case a combination of still more elemental units, or atoms. Drury's chemical analogy is particularly descriptive of the use and importance of this unit in the science of management. He says:

> . . . the elements into which each job may be split up are comparable with similar elements which enter into other jobs. Thus, to draw an analogy, the jobs in any one trade might be likened to chemical compounds. Both are countless in their number and confusing in their complexity. But just as the chemist can reduce by analysis all of his innumerable compounds to some seventy interchangeable elements, so also the time study man, on splitting up his thousands of factory jobs into their component elements, finds that he has reduced them all to a comparatively small number of fundamental operations.[70]

The significance of such a unit and its relationship to the whole science of management is still better shown by Messrs. Berry and Robson:

> . . . any manual operation can be broken down into its

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[67] Copley's F. W. Taylor.

[68] Frank B. Gilbreth, "The Classification of Work," *op. cit.*, p. 106.

[69] Allan H. Mogensen, *op. cit.*, p. 87.

[70] Horace B. Drury, *op. cit.*, p. 58.

> elements so nearly uniform that an accurate standard time can be synthetically constructed. The times required to turn the forearm about the elbow or to move the fingers, for example, are approximately uniform and can be measured with a high degree of exactness. . . . these elementary times are practically universal, being the same whether found in a manual operation or in running a machine. As data are accumulated it should be possible to carry out Taylor's idea of compiling handbooks of standard times which would save all the endless repetition of hasty, half baked time studies, and replace them with thorough and scientific studies. . . .[71]

Gilbreth gave to these elements or atoms the name "therblig"—Gilbreth spelled backwards. He says: "This word was coined for the purpose of having a short word which will save the motions necessary to write such long descriptions as 'The seventeen categories into which the Motion Study elementary sub-divisions of a cycle of motions fall.' "[72] It is, then, this *therblig* that constitutes the ultimate element in scientific management, and the fundamental unit of work with which an organization must be constructed. All manual labor can therefore be reduced to a matter of particular combinations of these absolute units, which may be standardized as to time, cost, and fatigue. The therblig purports to provide the science of management with a physical unit which may serve in this science as the atom in chemistry, the erg in physics, the cell in biology, or the dollar in economics. With its discovery and development the evolution of the analysis of human effort is brought up to date.

A description of the evolution of the analysis of human effort could hardly be closed, however, without some reference to its possible continuation in the future, for at present micromotion study, the most fundamental technique in scientific management, is yet in its infancy, and psychology is just beginning to contribute in a practical way. In fact, the possible paths of inquiry and discovery for the future are almost illimitable. The motion-picture camera, projector, and other graphic devices have enabled the motions of experts to be projected at a faster or slower speed, at a standstill, or in reverse direction, so as to measure and compare the therbligs performed and to study their relationships to one another, to machine operation, and to fatigue.[73] Motion study and engineering have collaborated to produce new tools and devices for eliminating many difficult and irksome motions, and to produce new machines so modified as to perform many of the therbligs entirely by mechanical equipment. So far, motion study has done relatively little to reduce eye work, which enters into nearly every manual operation, to a matter of therbligs. However, the trail has been blazed by the illuminating engineers for improving vision and avoiding eyestrain, and what the photoelectric cell does not entirely eliminate, motion study stands ready to improve and to measure. By analyzing and measuring not only eye work but the work of the other sense organs as well, a step will be made toward subjecting work that is now regarded as mental to scientific treatment.

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[71] E. L. Berry and H. C. Robson, "Motion Study in a Job Shop," in *Factory and Industrial Management*, XXCIII (1932), p. 285.

[72] Frank B. Gilbreth, "The Classification of Work," *op. cit.*, p. 107.

Finally, motion study in addition to analyzing and measuring work in scientific fashion, and to contributing to the avoidance and the amelioration of work, may become itself a means of making work interesting to the workers. To quote again from Mogensen's excellent description:

> Knowledge of measuring, selecting and studying of therbligs makes all work fascinating, for which the best method known and performed under given conditions may be called for practical purposes—*The One Best Way to Do Work.* A still better method with new tools and new conditions is always possible. There is no instance or example that cannot be improved with greater knowledge of the therbligs. The skilled worker with a knowledge of therbligs performing any work ordinarily considered monotonous has the opportunity to improve the temporary one best way almost without limit.[74]

SCIENTIFIC MANAGEMENT AND ECONOMICS

Before concluding the evolution of the fundamentals of organization and management an effort should be made to correlate scientific management with general economic theory. Some such correlation seems to be much needed, for the majority of treatises on the principles of economics all but ignore scientific management and its fundamentals. As observed by a student who has made a statistical survey of references to scientific management in economic literature: if one ". . . were to look into our textbooks on general or elementary economic principles expecting to find scientific management discussed there, he would be doomed to disappointment."[75] A casual survey of general treatises on management and organization will reveal likewise an absence of discussions on economic principles. This state of affairs, we believe, should not exist. Economists should no longer ignore the dynamics of scientific management and its repercussions, nor should managers and organizers fail to take into consideration the applications and the implications of economic principles and economic forces.

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[73] See Allan H. Mogensen, *op. cit.*, pp. 91-92.

[74] *Ibid.*, p. 97.

Although Taylor, Gilbreth, and others of the group have made a contribution to production economics, they are not to be regarded properly as economists. These men were engineers and managers by practice and profession. They were not students of economics as such, nor did they pretend to correlate their work with economic doctrine or develop a distinct economic system. In fact, it was seldom that anyone in the beginning saw in Taylor's work anything of consequence to economics. There have been, however, notable exceptions. For instance, in the discussion of Taylor's "A Piece Rate System," Mr. John A. Penton, formerly president of the Brotherhood of Machine Moulders, stated as follows: "I want to congratulate Mr. Taylor and to say that his paper, I think, is a landmark in the field of political economy. . . ."[76]

As previously seen, Taylor introduced his chief work with statements that showed him to be, along with Adam Smith, equally concerned in "the wealth of nations." Furthermore, he did not lack a definite philosophy of production in which his system, and his life's work, found justification in terms other than those of dollars and cents. An examination of this philosophy in the light of economic theory should serve therefore to indicate the proper place and function of scientific management in the science of economics.

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[75] C. H. Donovan, "Scientific Management in Economic Theory," an unpublished manuscript written at the University of North Carolina.

[76] See C. Bertrand Thompson, *Scientific Management* (Cambridge, Massachusetts: Harvard University Press, 1914), p. 672.

The economic objectives of scientific management were enunciated in several places by Dr. Taylor. In one place he said: "The principal object of management should be to secure the maximum prosperity for the employer, coupled with the maximum prosperity for each employé."[77] In another he stated that: "This book has been written mainly with the object of advocating *high wages* and *low labor cost* as the foundation of the best management. . . ."[78]

In order to understand fully Taylor's meaning in these statements it is necessary to understand first his concept of value, or that in terms of which he reckons prosperity, wages, and costs. And, in order to understand Taylor's concept of value, it is necessary to examine the concepts of value of the economists.

Adam Smith, as previously noted, had two concepts of value, one which he called value in use and the other value in exchange. His value in use, as also noted, was caused by and measured by labor; his value in exchange was caused by scarcity and measured by a pecuniary unit. These two concepts of value remain today a source of disagreement and confusion in economic literature. For example, Ely defines production as the creation of use-values, or utilities,[79] whereas Davenport says that production is the creation of exchange or scarcity values.[80] Likewise capital to some authors means use-values, or capital goods, but to others it means exchange-values, or capital values.

Taylor's analysis, as shown above, parallels Adam Smith's analysis of use-value, not exchange-value. This may seem strange to many students, who commonly associate Taylor and his group with business men and therefore with Davenport and price economics. However, economic theory makes strange bedfellows. This relationship of scientific management to economic theory is recognized and explained at some length by Professor Commons:

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[77] F. W. Taylor, *Principles of Scientific Management,* p. 9.

[78] F. W. Taylor, *Shop Management,* p. 22.

[79] See Richard T. Ely, *et al., Outlines of Economics* (5th revised ed., 1931), p. 110.

[80] See Herbert J. Davenport, *The Economics of Enterprise* (1918), p. 121.

> . . . Smith rejected use-value from economic theory, as did his successors, and considered that economic science had to do only with exchange-value. But modern scientific management has brought back use-value into economics, and Smith must have had a different meaning of use-value which led him to reject it. We find, indeed, that Smith actually employed the idea of use-value in all his reasonings. In fact, his whole philosophy was based on a theory of use-value. . . . [81]

Again in distinguishing between bargaining and managing as included in the meaning of "exchange," Dr. Commons says:

> Recent economic theory, since the incoming of "scientific management," has furnished two pairs of terms and two units of measurement which permit the above-mentioned double meaning of "exchange" to be clearly distinguished. The units of measurement are the man-hour and the dollar. The pairs of terms are input-output and outgo-income. Scientific management has restored the labor-theory of Ricardo and Marx, but under the name of Efficiency.[82]

In this way Commons distinguishes his "engineering economics," or the economics of scientific management based on the production of utilities, from his "business economics," which is based on the acquisition of values either by producing or by withholding production.[83] This distinction is fundamental to the proper understanding of the relationship of scientific management to economic doctrine. The economic objective of scientific management is therefore the objective of abundance, an abundance of economic goods and services efficiently produced. Taylor's prosperity is not few goods at high monetary values but many goods at low values; his wages are real wages; and his low costs are low costs in terms of human effort, or dis-utility, per unit of product.

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[81] From John R. Commons, *Institutional Economics* (1934), pp. 173-174. By permission of The Macmillan Company, publishers.

[82] From John R. Commons, *Institutional Economics*, p. 66. By permission of The Macmillan Company, publishers.

[83] See *ibid.*, p. 286.

Taylor's economic philosophy is lacking in a general theory of distribution that might be applied with any degree of consistency under the present economic organization. He probably did not mean to challenge the theory of distribution then more or less generally accepted, the marginal productivity theory. Had he ever attempted to orient his system with economic theory he probably would have accepted the productivity theory as adequate for accounting for wage levels in general. He believed that every person should receive the equivalent of the product of his labor, and that this product should be a maximum.

Such a belief, as far as it goes, would not be out of accord with the idea of distributive justice of many of us; the difficulty, of course, lies in determining and measuring the product of any one person in a complex society. If the division of labor were always in its simplest form, in which "one kind of commodity is carried to completion by one man,"[84] it would then be possible to identify the product of a worker, and moreover to separate it from the person of the laborer and have it in a form more suitable for an accurate evaluation by the market process. Today the division of labor is found seldom in its simplest form, but in just the opposite, thousands cooperating to produce a commodity or commodities jointly. Consequently, the commodity markets can no longer be counted upon to mete out a just reward for each individual worker, and neither can the same marketing process any longer be counted upon to fix a just and accurate wage, since a laborer must now barter his own person against a product indeterminable by either himself or the person who employs him.

Scientific management attempts to remedy just this situation, by accurately measuring the particular effort of each individual according to scientific standards of performance, instead of by leaving it to be measured by the mechanisms of exchange. The unit for thus measuring labor is the therblig of Gilbreth as previously described. This unit, it should be noted, is much more refined and more accurate than the man-hour of Karl Marx. Therbligs may be added together to constitute man-hours, but they include many factors other than men and hours. Of importance to the workmen and to society is the fact that they take into consideration skill, fatigue, and other factors comprising human ability to do work. They are of importance to employers in that they are units of work accomplished and capable of being measured as to time and cost. In them are correlated therefore both human effort and human productivity, and upon them, or their approximate equivalents, scientific management depends for the determination of an adequate measure of labor and its compensation.

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[84] From John B. Clark, *The Distribution of Wealth*, p. 379. By permission of The Macmillan Company, publishers.

Taylor seemed to have little sympathy with those who advocated the combination either of capital, or of labor, against the other. He says:"The majority of these men believe that the fundamental interests of employés and employers are necessarily antagonistic. Scientific management, on the contrary, has for its very foundation the firm conviction that the true interests of the two are one and the same. . . ."[85] The naïveté of this statement may have led students of economics to be somewhat skeptical of the security of the foundations of scientific management, for it seems to overlook the fact that as well as harmony of interests there are rivalry and opposition of interests. When exchange value is taken as the foundation of the economic system it is necessary to accept not only a unit of measurement in which scarcity is a factor of high value, but also a method or measurement in which withholding, cunning, secrecy, higgling, and other devices are important instruments. It is not, of course, in the process of producing utilities that antagonism arises, but in the processes of exchange and distribution, which are by nature primarily acquisitive and only incidentally productive. It is for this reason that an agent of production must set up for itself acquisitive

[85] F. W. Taylor, *The Principles of Scientific Management*, p. 10.

machinery in order that it may be sure of obtaining its proper distributive share.

This point should be emphasized because it furnishes the key to an understanding of one of the features of scientific management most often misinterpreted, that is, its frequent opposition to collective bargaining. It is, perhaps, this opposition more than any other policy of scientific management, or rather of some of its exponents, that has lost it the sympathy of the labor economists, who possibly, to a greater extent than any other group, have held to universal welfare rather than acquisitive wealth as the goal of the productive process.

Modern production is more than ever a cooperative and a collective process, for the knowledge and skill required in our large-scale industries can no longer be supplied or even adequately controlled by one or a few proprietary managers. As Diemer has stated: "Functional control came in answer to a call for help from the business owners and managers of industrial establishments who were becoming nervous wrecks because of the need of constant running from one department to another for information which could not be half given."[86] In place of the old one-man control, scientific management substitutes the cooperative control of specialists and workers, and the teamwork and good will of every member of the organization. It theoretically abolishes the old hierarchic distinction between workers and bosses and in its stead makes the lowliest worker king in his own function.

The bargaining process, on the contrary, whether collective or individual, is by nature neither cooperative nor productive; it pits the one side against the other, thereby breeding contention, suspicion, and ill will. It is therefore illogical to expect workers to cooperate and work harmoniously to produce when they are constantly compelled to bargain and fight for a fair share of the product. "Scientific management attempts to substitute, in the relations between employers and workers, the government of fact and law for the rule of force and opinion. It substitutes exact knowledge for guess work, and seeks to establish a code of natural laws equally binding upon employers and workmen."[87]

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[86] Hugo Diemer, *Factory Organization and Administration* (3d ed.; New York: McGraw-Hill Book Company, Inc., 1921), pp. 202-203.

Scientific management, therefore, stands for the just determination of a wage, whether it be by capital, organized labor, the government, an outside mediator or arbitrator, or by one individual or a group. It merely opposes the determination of a wage rate by resorting to the bargaining power of either party. Furthermore, it insists that each person's wage should be based upon his individual productivity, and it seeks to determine just what that productivity is.

Odd as it may seem, in wage disputes both capital and labor usually subscribe to the formula, "an honest wage for an honest day's work," yet neither party seems to be concerned with what constitutes an honest day's work. To quote again from Wissler: "As a matter of fact neither employers nor workers are always zealous for the exact measurement of labor. Neither may strongly desire it, so long as there is any apparent advantage for either in trading upon the ignorance or helplessness of the other."[88] And according to Dutton: "Where no one knows what constitutes a fair standard, a common method of getting work done is *driving*."[89] And, where such is the case, a common method of protecting wage rates is soldiering. "It is this lack of a measuring stick which constitutes the real problem of wage payment."[90] According to the principles of scientific management, on the other hand: "What constitutes a fair day's work will be a question for scientific investigation, instead of a subject to be bargained and haggled over."[91]

In reality, of course, it cannot be denied that there are two different ways by which any person may increase his distributive share of the social income; and he may be counted upon to use his abilities in either or both of these ways. As Commons explains:

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[87] "The Labor Claims of Scientific Management According to Mr. Frederick W. Taylor," in R. F. Hoxie, *Scientific Management and Labor*, p. 140.

[88] Willis Wissler, *Business Administration* (New York: McGraw-Hill Book Company, Inc., 1931), p. 517.

[89] Henry P. Dutton, *op. cit.*, p. 256.

[90] *Ibid.*, p. 257.

[91] F. W. Taylor, *The Principles of Scientific Management*, pp. 142-143.

> We thus have two meanings of Human Ability—producing power and bargaining power. Producing power is the mental, managerial, and manual ability which is power to create *wealth*, but bargaining power is proprietary ability to withhold products or production pending the negotiations for transfer of *ownership* of wealth. The one creates use-value, the other determines scarcity-values. Each is human ability in action, and, though inseparable socially, they can be distinguished by analysis or division of labor, and measured separately.[92]

Scientific management seeks to determine wages thus not by bargaining power, or economic might, but by producing power, or socially desirable standards of right and justice.

The proponents of scientific management, though often found in opposition to collective bargaining and labor unions, have not been blind to their advantages to labor under the present economic order. In fact, in commenting upon industries that are not scientifically organized and managed they are sometimes even staunch advocates of union organization. The advantages of the union have been well recognized by Gantt, an associate of Taylor and one of the founders of scientific management. He says:

> It is undeniable that unions have advanced the cause of workmen in general, and we must not blame them for using force to accomplish their ends. It was the only means they had. If we wish them to use any other means we must provide them with means that they will consider more desirable, and that will give better results. . . . The idea of the union is to get a higher rate of wages for the whole class, because in general nobody in that class can get a substantially higher rate unless the whole class gets a higher rate.
>
> The employer usually pays but one rate of wages to one class of workmen, because, as a rule, he has no means of gauging the amount of work each man does.[93]

Gantt further explains how wage rates are ordinarily established, and the results of rates so established:

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[92] From John R. Commons, *Institutional Economics*, p. 267. By permission of The Macmillan Company, publishers.

[93] H. L. Gantt, *Work, Wages, and Profits* (2d ed.; New York: McGraw-Hill Book Company, Inc., 1913), pp. 57-58.

> In hiring men he [the employer] offers the wages he can get the cheapest man for, and if the good man stood out for higher wages, he would not get any wages at all.[94]
>
> Under ordinary conditions where there is no union, the class wage is practically gauged by the wages the poor workman will accept, and the good workman soon becomes dissatisfied and sets his pace by that of his less efficient neighbor, with the result that the general tone of the shop is lowered.
>
> On the other hand, when the union has had the class wage raised, the inefficient workman is demoralized by getting more than he is worth, while the efficient man still does less than he could, for it is not absolute wages that stimulate exertion, but difference in wages.[95]

Scientific management attempts to correct this situation by accurately measuring every worker's individual contribution and paying him a wage proportional to his individual productivity. Both Gantt and Taylor emphasized the use of high incentive wage payment systems as being an essential characteristic of scientific management.

Scientific management has always stood for high wages. It stands for high incentive wages, good working conditions, adequate welfare activities, and good labor relations in general, because these in the long run pay. Those who think that scientific management treats a worker as a machine often forget what a delicate, high-priced, long-lived, and psychological type of machine he is regarded to be. High real wages are paid because they not only attract and hold a good worker but because they also enable him to maintain a high degree of working efficiency and because they stimulate him to give his best in energy, ingenuity, and loyalty. Scientific management is able to pay high wages because of the increase in the productivity of its workers and the increase in the efficiency of the plant and the system. Owing to the high efficiency of the organization in all its activities, therefore, high wages may be paid though labor costs per unit of output remain low.

It should be noted in this respect, however, that scientific management does not attempt to offer a solution for all problems concerning labor and its employment. It makes no attempt to determine what amount or what portion of the total income of society should go to labor, or to any class or group of laborers. It would, in fact, be utopian to believe that the economically weak would ever cease to need protection from the strong and the ruthless, that codes of conduct and umpires would not be needed to prevent cheating and the taking of unfair advantage, or that all problems of employment would be automatically solved by any system. Moreover, the standards established by scientific management might not always be desirable standards from a social point of view. There would still be the need, it seems, for the establishment and maintenance of socially desirable standards of human effort and of remuneration, based upon a scientifically determined estimate of what the productive powers of the national economy could afford. Such standards being provided as guides or basing points, scientific management furnishes the institutions and the technique for enlarging production and for applying the standards to individuals in ways more just than are possible through the exercise of bargaining power alone.

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[94] *Ibid.*, p. 58.

[95] *Ibid.*, pp. 59-60.

It should be noted, finally, that scientific management finds due application in several plans of economic organization, each based upon different, and in some respects contradictory, doctrines. Commons associates scientific management with Marx and communism.[96] On the other hand, it is held to be an instrument of high capitalism, and of rationalization, as noted below.[97] Its contribution to the betterment of the present order is stated by Professor McCracken as follows:

> Capitalism has been severely wounded in the house of its friends,—the "relax-the-anti-trust-laws" men. Its future health and security lies in a general return to healthy, wholesome competition, with emphasis on efficiency and lower prices rather than upon scarcity and higher prices. Business men would do well to give more time to "scientific management" as first set forth by Frederick W. Taylor, and less to combinations in restraint of trade. Taylor

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[96] See John R. Commons, *op. cit.*, p. 265.

[97] *Vide infra*, Chap. VIII, *s. v.* Rationalization.

> never assented to the need of following the scarcity principle. He steadily maintained that the unmet needs of consumers were too great; that the rapid discovery and adoption of greater efficiency would not cause supply to exceed effective demand, provided only that producers shared the gains with consumers in the lower prices which these discoveries made possible.[98]

This discussion of scientific management and economics must serve, therefore, to indicate briefly the proper place and function of the philosophy of scientific management in economic theory, and to point out the applications of this philosophy in the present economic system and its proper limitations. Scientific management offers a definite contribution to economic theory, an accurate comprehension of which is essential for the appraisal of its serviceability to mankind. Finally, for present purposes, an understanding of the origin and development of the basic units of utility and disutility is needed for an adequate appreciation of the units with which an organization may be scientifically constructed.

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[98] H. L. McCracken, "An Appraisal of the Possibility of Plenty," *The Society for the Advancement of Management Journal,* I, No. 2, March, 1936, p. 59.

CHAPTER III

THE ORGANIZATION OF WORK

The last chapter was chiefly concerned with an evolution of analysis; its object was to trace the progress of attempts to analyze human effort and to find its true elements. This evolution was brought up to date with the discovery or derivation of the therblig as the elementary unit or atom of manual labor. It is, therefore, the therblig that must serve as the basic element in next synthesizing or organizing human effort. The combining of these therbligs so as to compose individual jobs and duties, and these so as to perform the organic functions of the enterprise, will be discussed under the title "organization structure" in the next chapter.

Before proceeding with a study of organization structure, however, it is first necessary to examine the work to be done by the proposed organization. The purpose of an organization is always to do work of some kind, and no attempt should be made to construct an organization until the nature of the work it must perform is known and understood. The problem of this chapter, therefore, is to analyze work, to determine its nature and its elements, and to see how these elements are combined so as to compose particular operations, then systems and functions, and, finally, the entire productive process.

PHYSICAL WORK

The word "work" itself is used in many fields of learning, and consequently it has a wide variety of meanings. In physics, perhaps more than in any other field, its meaning is definite and capable of mathematical expression. An explanation of this meaning may be given here for two reasons: first, to show how the physicist begins with fundamental concepts and with these constructs a system, and, second, to provide a starting point in analyzing industrial and human work.

The fundamental concepts in physics are those of mass (M), space (L), and time (T). These elements are capable of being measured by comparing them with some quantity of the same kind assumed as the standard, or unit, such as the gram, centimeter, or second. These units may then be combined so as to provide other, more complex concepts descriptive of nature, as follows: L = length; L^2 = area; L^3 = volume; M/L^3 = density; L/T = velocity or motion; L/T^2 = acceleration, the time rate of change of motion; ML^2 = moment of inertia; ML/T = momentum, the quantity of motion possessed by a body; ML/T^2 = force, that which tends to change the motion of a body, a unit of which is a dyne; ML^2/T^2 = work, which "consists in changing a state of motion or stress in opposition to forces tending to resist such an effect," a unit of which being an erg, joule, or foot-pound; and ML^2/T^3 = power, which "involves the idea of the rate at which work is done, and may be defined as the time rate of doing work," a unit of which is a watt, kilowatt, or horsepower.[1]

Work may also be thought of as power being applied during a period of time, for example, kilowatt-hours, or horsepower-hours. "Energy is the capability of doing work, possessed by a system by virtue of work having been previously done upon it."[2] It exists in two forms, potential and kinetic. The unit of energy is the same as the unit of work.[3] It is in this way, then, that the physicist starting with the three fundamental concepts builds up the concepts of power and of work or energy which may be dealt with as absolute quantities.

INDUSTRIAL WORK

Industrial work properly begins with physical work, for the former always involves the utilization of energy in some form, whether mechanical, thermal, chemical, or electrical, all of which may be reduced to a common denomination and measured as applied power. These units of energy may, in turn, be translated into terms of dollars and cents and therefore computed as costs and compared with similar standardized units in any industry or in any country. Indeed, so well standardized has the unit of work or energy become that the technocrats would even make the erg the standard of monetary value, for, as they see it, power is the most pervasive standardized element in the present industrial order.[4]

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[1] From John O. Reed and Karl E. Guthe, *College Physics* (1913), pp. 42-44. By permission of The Macmillan Company, publishers.

[2] From John O. Reed and Karl E. Guthe, *College Physics*, p. 45. By permission of The Macmillan Company, publishers.

[3] See Henry Crew, *General Physics* (3rd ed.; New York: The Macmillan Company, 1920), Chaps. I and III.

Industrial work, of course, involves more than mere physical work; the far more important though less concrete and less standardized factor is technological knowledge. This term may be used here, for lack of a more specific one, to include all scientific data and knowledge concerning materials, machines, and physical processes, or, in fact, all recorded factual information. It is this information that is necessary in order to maintain and operate machines, to utilize physical energy in all its forms, and to direct and control technical industrial processes.

Technological knowledge unlike physical energy has never been resolved into any sort of standardized elemental units or atoms. However, the factual knowledge concerning any industrial operation may be divided into infinitely small units of data which may be listed as separate items in a body of information. These items may then be classified and combined so as to compose an independent variable, which may be used as a known quantity in a mathematical formula, or as the factual basis for the derivation of a general law. The application of the scientific method to the "mysteries" of traditional arts and skilled trades is nowhere better illustrated than in Taylor's classic study of the "Art of Cutting Metals." His analysis of this art found that it could be reduced to a matter of certain factual knowledge independent of the skill and personal judgment of the worker. In order to derive this knowledge and thereby transform the cutting of metals from an art into a science, Taylor and his associates spent thousand of dollars in conducting numerous experiments running over a period of a quarter of a century. His own account shows clearly the nature of his problem:

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[4] See Howard Scott, "Technology Smashes the Price System," in *Harper's Magazine*, CLXVI (1933), pp. 129-142.

> All of these experiments were made to enable us to answer correctly the two questions which face every machinist each time that he does a piece of work in a metal-cutting machine, such as a lathe, planer, drill press, or milling machine. These two questions are: In order to do the work in the quickest time, at what cutting speed shall I run my machine? And what feed shall I use?
>
> They sound so simple that they would appear to call for merely the trained judgment of any good mechanic. In fact, however, after working 26 years, it has been found that the answer in every case involves the solution of an intricate mathematical problem, in which the effect of twelve independent variables must be determined.[5]

Thus, Taylor's analysis resulted in the isolation of twelve independent elements each of which had an important effect upon the answer to his two original questions. He then derived a law for the exact expression of the knowledge contained in each of these elements, and as he says: "After these laws had been investigated and the various formulae which mathematically expressed them had been determined, there still remained the difficult task of how to solve one of these complicated mathematical problems quickly enough to make this knowledge available for every-day use."[6] In order to solve this problem, Taylor found, only with great difficulty, a mathematician who could solve a problem containing the twelve independent variables. Even with the solution of this problem, however, his difficulties were not yet over, for it required as much time to solve the mathematical formulae as it did to do the actual work. He and Mr. Carl G. Barth, his associate, eventually developed a slide rule which met this difficulty also. He says: "By means of this slide-rule, one of these intricate problems can be solved in less than a half minute by any good mechanic, whether he understands anything about mathematics or not, thus making available for every-day, practical use the years of experimenting on the art of cutting metals."[7]

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[5] F. W. Taylor, *The Principles of Scientific Management* (New York: Harper and Brothers, 1911), pp. 106-107.

[6] *Ibid.*, p. 110.

Thus, by the application of the scientific method, the art and the skill residing in the dexterity and judgment of the person may be abstracted and transferred to a machine, or recorded as absolute factual data, so that an ordinary semiskilled mechanic can solve in a few minutes a mathematical problem which remained a poser to the most learned for many years. Technological knowledge tends to become a matter of formulae, charts, tables, and gauges, as simple in use as the tools of the old handicraftsman. Even the processes of building machines, drawing plans, and conducting scientific research and experiment tend themselves to become standardized and subject to routine procedure. So important has this factor become that industries are establishing research and experimental laboratories for discovering and inventing new knowledge and new devices; and they are establishing technical libraries and museums to contain this knowledge, as well as schools and publications to make it known to their employees. As Alfred Krupp, the great German steel manufacturer, once said:

> What I shall attempt to bring about is, that nothing shall be dependent upon the life or existence of any particular person; that nothing of any importance shall happen or be caused to happen without the foreknowledge and approval of the management; that the past and the determinable future of the establishment can be learned in the files of the management without asking a question of any mortal.[8]

HUMAN WORK

Industrial work involves also the work of human beings, for no matter how completely energized and mechanized an industrial plant may become it can never entirely dispense with the work and intelligence of man. It is interesting to note that F. W. Taylor in his early attempts to analyze human effort sought to reduce human work to terms of physical work. He went so far as to conduct several extensive series of experiments in order to discover some law or laws governing how much physical work a man could do. He says:

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[7] *Ibid.*, p. 111.

[8] See Fredrick L. Nussbaum, *A History of the Economic Institutions of Modern Europe* (New York: F. S. Crofts and Company, 1933), p. 379.

> After completing this series of experiments, therefore, each man's work for each day was translated into foot-pounds of energy, and to our surprise we found that there was no constant or uniform relation between the foot-pounds of energy which the man exerted during a day and the tiring effect of his work. On some kinds of work the man would be tired out when doing perhaps no more than one-eighth of a horse-power, while in others he would be tired to no greater extent by doing half a horse-power of work. We failed, therefore, to find any law which was an accurate guide to the maximum day's work for a first-class workman.[9]

Although these experiments failed to reduce the work of man to a matter of physical units of work which would enable this work to be dealt with as a matter of engineering, they did, however, lead to an important law of human work and fatigue, which he states as follows: "And the law is that for each given pull or push on the man's arms it is possible for the workman to be under load for only a definite percentage of the day. . . . And as the load becomes lighter, the percentage of the day under which the man can remain under load increases."[10]

The cheapening of power and its application to industrial operations and processes of intricate and complex kinds has left human effort as a source of physical energy far too expensive to be used in any sort of heavy routine work. As Taylor's experiments have shown, man does not behave according to the laws of physics or mechanics, but according to laws of fatigue and of human nature. The only universal basic element so far developed for human effort is the therblig, which is not an element commensurable in terms of physical work, but a unit of bodily motion and of perception and decision. Although the therblig may be performed with the aid of some mechanical device or tool, or along with some machine movement, it cannot be itself regarded as an engineering unit. It is a physiological and a psychological unit, dependent upon and influenced by human anatomy, aptitudes, reactions, and emotions.

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[9] F. W. Taylor, *op. cit.*, p. 55.

[10] *Ibid.*, p. 57.

The sixteen therbligs first developed by the Gilbreths were as follows: (1) Search, (2) Find, (3) Select, (4) Grasp, (5) Position, (6) Assemble, (7) Use, (8) Disassemble or take apart, (9) Inspect, (10) Transport, loaded, (11) Pre-position for next operation, (12) Release load, (13) Transport, empty, (14) Wait (unavoidable delay), (15) Wait (avoidable delay), (16) Rest (for overcoming fatigue).[11] Later Gilbreth added: (17) Plan, and as he says: "It is conceivable that sometime in the future an eighteenth and possibly more therbligs will be found, and we seem near to their discovery at the present time. The discovery of additional therbligs pertaining to the phenomena of skill and automaticity seems inevitable."[12] And indeed an eighteenth, Hold, has been added recently by other workers in motion study.[13]

These eighteen therbligs constitute, therefore, the alphabet of motion study and the basic elements of human effort. As stated, they may be performed by themselves, in using some tool, or as part of a machine operation. In fact, the motion study of any manual operation by breaking that operation down into a series of simple elemental motions has usually shown that many of these motions can be easily transferred to a machine and performed thereafter as part of the machine operation. The cigarette packaging machine, for example, performs a series of distinct mechanical motions. The motion study of an operation further reveals, in most cases, that many motions may be entirely dispensed with by the use of tools and especially designed equipment. Gilbreth's experiments with crippled soldiers showed that by a little practice in the use of certain devices quite skilled operations could be performed by persons with missing members or organs. Motion study has shown, moreover, that many of the motions usually performed in operations are entirely useless—lost motion—and that others can be greatly improved as to both speed and accuracy. Motion study, therefore, has furnished industry with a standardized unit, and a technique that will enable management to bring under control and measurement the manual work of human beings just as the engineers and other scientists have done for the physical work of machines and other technical factors.

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[11] See Frank B. and Lillian M. Gilbreth, *Applied Motion Study* (New York: The Macmillan Company, 1919), p. 138.

[12] Frank B. Gilbreth, "The Classification of Work," in *Reducing the Cost of Business* (New York: The Society of Industrial Engineers, Vol. VII, No. 1, 1924), p. 109.

[13] See Allan H. Mogensen, *Common Sense Applied to Motion and Time Study* (New York: McGraw-Hill Book Company, Inc., 1932), p. 91.

The final factor in industrial work to be considered, and no doubt the most important of all, is what may be designated as creative, or purely intellectual, work. Such a factor has largely evaded all attempts of scientific analysis, except, to some extent, at the hands of the psychologists and metaphysicians. Of course, much has been learned about such a factor, the conditions affecting such work, etc., but it still remains inextricably associated with certain individual persons in the form of skill, artistry, education and training, common sense and good judgment, or understanding of human nature, and so on. The therbligs Plan and Decision are mere pauses to allow for, perhaps, eye focus or reaction time; they do not involve creative thinking of a high order. It is hardly conceivable that the human mind will in the near future, if ever, be able to analyze completely its own process and reduce it to the terms of any sort of standardized elements. This factor must probably always remain the great illimitable reservoir of unexplored forces from which other factors may be fed and enriched. Each scientific discovery does not diminish the content of this supply, but increases it by opening up new fields and new opportunities for still other discoveries, inventions, and improvements.

THE SYNTHESIS OR ORGANIZATION OF WORK

Industrial work having been analyzed into its principal factors and their elements, it is next necessary to attempt a synthesis of these factors and elements so that their combined effect will perform the desired work of the enterprise. These factors were: (1) the physical equipment, tools and machines, assumed as given; (2) physical energy or power to run the machines; (3) the objective technological knowledge involved in operating the machines or in performing any of the technical functions of the enterprise; (4) human manual effort in terms of therbligs and the conditions surrounding and supplementing their performance; and, finally, (5) creative intelligence and ingenuity, or, in other words, such other human effort as cannot be at present standardized. The combining of the first three of these factors is usually considered to be purely a matter of engineering; the combining of these with the last two factors is more particularly the task of management. In America the practice has usually been for the engineers to perform their function of combining and organizing the physical and technical factors first and often with improper regard for the human factor. This is especially true where the productive process has required a large capital investment in plant and equipment. The labor factor then becomes the variable and adaptable factor. In England, it seems, where customs and habits are more firmly fixed and where trade unions have a greater influence upon the conditions of employment, labor frequently tends to become the relatively fixed factor, and physical equipment along with many financial considerations become the variable and adaptable factors in the enterprise.[14]

In practice, of course, neither factor can be completely ignored in considering another. In designing any industrial enterprise the combining of no two elements should be completed without proper consideration of all elements entering into the productive process. Labor should not throttle science and invention, nor should these be so used as to make the conditions of work in any way deleterious to the welfare of the workers. From a broad social and economic standpoint the human factor should, no doubt, receive first consideration, but from the standpoint of efficient physical production certain technical processes and equipment must be taken as essential to the production of the particular product.

In reality there should, perhaps, rather seldom be conflicts between the interests of the respective factors of such a nature as to hinder productive efficiency or orderly progress. Usually the technical and physical factors may be taken as relatively fixed, for man is by nature a highly versatile agent. To quote Mr. E. P. Cathcart: "No man-made machine has ever a tithe of the adaptability, the resilience and co-ordinated activity possessed by man. He can adjust himself to the performance of work from the finest to the coarsest, from the lightest to the most severe. The gamut of his powers is well-nigh without limit."[15] He also adds, however:

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[14] See Alfred Marshall, *Industry and Trade* (3rd ed.; New York: The Macmillan Company, 1920), p. 382.

> Too often the inventor of the most beautiful of machines is so intent on the elaboration of the design, which will carry out the particular purpose for which it is required—a fit and proper aim without doubt—that he seems to forget the operator is to be a human being of average size, of average physique and of average intelligence, who is capable of developing aches and pains and fatigue.[16]

It is not to be supposed that any one of these factors is combined *en masse* or as a lump sum with another in the process of synthesizing the work of an industry. For some purposes they may be spoken of as separate and distinct entities; in the organizing of work, however, each factor must be divided into small workable units so that particular combinations may be effected to perform the desired work also in small units. Scientific analysts have indeed derived such units of almost infinitesimal dimensions; for example, it takes 10^7 ergs per second to equal one watt, our common unit of power; 2000 of Gilbreth's winks to equal one minute; and sometimes an almost infinite number of items to constitute the factual data sufficient for one general statement or law. Such units may, of course, be too small for practical purposes when used alone; one watt of power, one revolution of a wheel, one unrelated item of information, or the performance of one therblig, may be insufficient to produce any purposeful effect. No arbitrary numerical grouping of these units can be predetermined, however, for their grouping is entirely dependent upon the particular operation to be performed, or, in other words, upon the size of the unit of work in each case.

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[15] E. P. Cathcart, "The Physiology and the Psychology of Work," in The British Association for the Advancement of Science, *Business and Science* (London: The Sylvan Press, 1931), p. 109.

[16] *Ibid.*, p. 112.

UNITS OF WORK

A "work unit is an operation or part of an operation that cannot practically be subdivided under the prevailing conditions of performance."[17] It may be taken as a certain accomplishment in the productive process which is definitely ascertainable but for practical purposes incommensurable in at least some of its aspects. It may include, for instance, one part of a continuous machine operation along with certain supervision of an operator, or a single cycle of therbligs combined with the necessary operation or use of certain equipment and the application of any knowledge essential to the performance. In some cases it may be impossible to measure this unit with respect to performance time, quality, or individual cost, without interrupting a continuous process. Such a unit may represent, for example, pushing a button, debiting an account, tightening a screw, approving an item of expense, pulling a lever, or merely watching a mechanical or chemical performance. Industrial work is composed of a myriad of these small performances which are united to make up the total work of the enterprise.

The next step in the synthesis of work is the grouping of these work or performance units into a still larger unit. Such a unit may be designated as an operation or production unit, or merely as an operation, which Lichtner defines as "any course or series of acts performed either by one workman or a group of workmen as a unit, which either adds one step to the complete process or constitutes in itself a complete process. . . ."[18] No hard and fast line of distinction can be drawn between the two kinds of units here defined, for in some cases one work unit may adequately fulfill the requirements of an operation unit. The work unit had to be defined largely in terms of what went into the process because the effect produced was often too small to be measured except as a phase in a continuous operation. A production unit may, on the other hand, be taken as a completed step or stage in the productive process. Such a unit should usually correspond to a "piece" under a piece-rate system, or to some convenient unit of machine output wherever the process is chiefly mechanical. It should be capable of accurate measurement as to quantity, as to quality, as to time required for the performance, and as to cost. A still more usable definition might designate it as the unit output of one production center.

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[17] L. P. Alford, *Laws of Management Applied to Manufacturing* (New York: The Ronald Press Company, copyright 1928), p. 131.

[18] William O. Lichtner, *Time Study and Job Analysis* (New York: The Ronald Press Company, copyright 1921), p. 155.

A production center is, in a narrow sense, any "place where work is performed, whether this be a machine, a bench, or simply a floor space. . . ."[19] It may be defined also in a larger sense in these terms: "The production center should include the workmen, the machines, space for storage of new material and completed units from the operation, supplementary apparatus of any kind needed in the performance of the operation, and a share of the aisle space required between that production center and the next."[20] It may consist of one worker and one or several machines tended by him, or one machine and the several workers tending it. The production center is the basic unit in designing the layout of factory buildings and in arranging their equipment. Indeed, when looked at from a production point of view, a factory is nothing more than a succession of related production centers. The production center is also a basic unit for cost accounting purposes. According to Dutton: "The most accurate method of expense distribution is undoubtedly the production center plan described by A. H. Church. His plan is to treat each machine or other producing unit, sometimes a whole group of similar machines, as a semi-independent little shop."[21]

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[19] Dexter S. Kimball, *Principles of Industrial Organization* (3rd ed.; New York: McGraw-Hill Book Company, Inc., 1925), p. 172.

[20] R. H. Lansburgh, *Industrial Management* (2d ed.; New York: John Wiley & Sons, Inc., 1928), p. 105.

[21] From Henry P. Dutton, *Factory Management* (1924), p. 219. By permission of The Macmillan Company, publishers.

By this method the cost of any operation unit may be determined by dividing the total expense of the production center by the number of units of output. The production center is equally important for the purposes of planning the organization of the personnel, for it ordinarily includes one individual worker, a worker and his helper, or not more than a single gang or small group whose members are so intimately associated through proximity and similarity of functions that they may be treated as a unit. The production center, therefore, forms one of the most useful units in the synthesis of industrial work. It usually marks the end and limit of detailed operation studies of the work of individual workers and machines, and the beginning of studies dealing with the plant as a whole.

The next stage in the synthesis of work is that of combining operations, or the activities of the various production centers, to constitute what are usually called processes. Processes consist of several operations, usually dissimilar and combined in series. A very simple process may consist of only one essential operation and other facilitating operations such as the movement of materials, inspection, etc. Usually, however, a process is composed of several successive operations grouped together for joint execution and control.

The final unit of work is necessarily that unit of finished commodity or service, which it is the purpose of the establishment to produce. The final phase in synthesizing work is, therefore, the process of combining the different operations first, perhaps, into groups or "processes," and then these so that they go together to constitute a unit or units of the finished product. It is this phase of industrial work to which the terms "production planning" and "production control" usually refer. After the product has been completely designed, detailed specifications have been drawn, and all necessary equipment and materials provided, the work is then routed through the plant. Routing is to the production of the finished product what motion study is to the single operation. It ". . . may be defined as the selection of paths or routes over which each piece is to travel in being transformed from raw material into finished product."[22] After the product or part has been routed it is next scheduled, or planned according to time. Scheduling is, accordingly, operation time study applied to the entire productive process; its function is to synchronize the various operations. The function of dispatching starts each actual operation according to the route and schedule, that of follow-up sees that operations are carried out as planned, and that of inspection determines and enforces quality as specified by the function of design. Cost accounting accumulates individual items of cost as the material in process moves from production center to production center so that they may be compiled to show unit costs of production as well as other financial information. In completing the final unit of work, the finished product, these functions, and perhaps others, must be performed, each of which must be definitely recognized and understood before it is possible to construct the personnel organization which is to perform and control them.

The particular ways or methods of combining the individual operations necessary in making any product are almost wholly determined by the physical and technical considerations in each case. In a continuous straight-line type of industry the materials will flow through the plant from production center to production center over a more or less fixed route, whereas in a job-order industry each job will be separately routed to the respective machines and specialized departments. In industries of the synthetical type there will be unit assemblies and subassemblies before the product is finally assembled in its completed form; and in analytical industries there will be joint products and by-products, each of which may also be processed as a separate product, but, of course, simultaneously with other processes. Each type of industry has its own particular problems in carrying out its work, making the performance of one function of major importance in one case and a different one in another. It is the particular nature and relationships of these parts and functions to one another and to the total work process that determine the form and structure of the personnel organization of each industrial enterprise.

[22] Dexter S. Kimball, *op. cit.*, p. 146.

Work or Process Charts

The best means for visualizing the work of an enterprise in all its particulars as well as in its entirety is by means of what is ordinarily called a process chart. It is also styled loosely by various other names, such as work, flow, production, or procedure diagrams, operation or routine charts, and so on. These charts serve to depict the various performances, operations, and processes which are necessary to the completion of a product. They may be used, of course, for various purposes, depending upon the necessities of each case. Mogensen says on this point:

> The first of the various tools of measurement listed in the order of their refinement is the process chart. This is a detailed record indicating the sequence of any process. . . . The chart is of great value in presenting information in condensed form. Many a manager has found himself irritated and often baffled by his inability to visualize the whole process under his direction.[23]

A complete detailed process chart of the entire productive process would, of course, be too clumsy a document for easy handling. It is, therefore, broken up into convenient divisions, and these into subdivisions, and so on, until every individual performance is recorded and shown in its proper relation to the work of the entire establishment.

The most detailed and elementary of these charts is usually called a simultaneous motion cycle chart, a right-hand-left-hand chart or, briefly, a simo chart. This chart shows every therblig performed by each hand or other part of the body, in its proper sequence and so represented as to indicate the time required for the performance of each element of the work. It contains frequently a single cycle of therbligs, or the elements necessary for the performance of one unit of manual work. For convenience these therbligs are often divided into three groups, namely, get ready, do it or *use*, and clean up or put away.

Wherever machine operations are involved, these also should be charted so that the operator can fully understand the work being performed. Machine operations must then be combined with the human operations, either singly as therbligs or as groups or cycles of therbligs. Such a chart, called by Mogensen a "man and machine" chart, is described as follows:

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[23] Allan H. Mogensen, *op. cit.*, p. 25.

> It is made up of two columns: one headed "Man" and the other "Machine." It shows in chronological order the operations and moves performed by the operator, together with the time element and the distance traveled. This chart does not go into any of the subdivisions of motions in an operation. Under the machine heading are shown the starts, stops, machining operations, and idle machine time in relation to the movements of the operator.[24]

This chart is based, therefore, upon a summary of individual human motions and machine performances. It brings together usually all the performances necessary to form a complete operation, or unit of production. This chart, or the simo chart where the work involves only human performances, may be easily developed so as to serve the purposes of an instruction card.

An instruction card seldom gives minute details of the elements of each motion or performance. It does, however, carry information in addition to that descriptive of motions alone. According to Professor Anderson:

> The culmination of operation study—operation study in action—is evidenced by instruction cards with accompanying standard rates for performance. An instruction card should inform the worker regarding the task in every particular, answer all questions of "what to do and how to do it," and give complete information of equipment, tools and materials used. Sketches or drawings are frequently helpful in showing arrangements or set-ups and in making instructions clear.[25]
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> Instruction cards separate planning from performance in a very effective way. They are now used generally throughout industry for a wide variety of tasks from

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[24] *Ibid.*, p. 30.

[25] Arthur G. Anderson, *Industrial Engineering and Factory Management* (New York: The Ronald Press Company, copyright 1928), p. 381.

> washing windows to the operation of intricate machinery.[26]

This chart contains all the information and technological knowledge ordinarily needed for the complete performance of an operation unit. In continuous industries making standardized products, it may cover all information necessary to the operation of a specialized machine, or for the performance of the job of one individual worker. It is, consequently, of fundamental importance in the construction of the human organization of the industry.

In order to show how the various operations are brought together in the proper sequence, process charts of a more extensive nature are prepared. These are usually designated as route sheets, assembly diagrams, or production charts. These charts depict the course of the order as it travels through the various operations described on the respective instruction cards. They may indicate also where and when each facilitating function of the industry contributes its particular service. If the productive process is a complex one, route sheets may be drawn for each part of the process and these route sheets summarized into a master production chart for the entire industry. By means of charts, therefore, the entire productive process, or the complete organization of work of the enterprise, from the performance of the first motion applied to the securing of the raw materials to the last finishing touch or final transaction, can be graphically illustrated and described. It is from a study of such records and charts that the plan of the main functions and departments of any industry should evolve.

SYSTEM

"A system is merely an orderly arrangement of parts."[27] The parts may consist of physical equipment, as, for instance, the parts of a heating system; or they may be only rules and regulations; in any case, however, the parts are of importance only with respect to their functions and their relationships to the other parts and to the complete process.

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[26] *Ibid.*, p. 383.

[27] Webster Robinson, *Fundamentals of Business Organization* (New York: McGraw-Hill Book Company, Inc., 1925), p. 136.

It is better, perhaps, to regard the parts as mere ways and means or routines and practices of performing work, for system has chiefly to do with methods whether in the form of physical devices, rules of procedure, or mental concepts. Viewed in its entirety: "System is the method pursued by the organization in carrying out its tasks and is the mechanism or process of management by which the efforts of the organization are standardized and unified."[28] A particular system is, of course, concerned only with the methods of accomplishing some particular task or performing some particular function in the enterprise.

The particular methods employed in any system should be derived from a scientific study of the technical considerations involved. "A workable system is evolved from within an organization, not brought in from the outside."[29] It is determined, therefore, by the result to be accomplished and the facilities available for accomplishing it, or, in other words, by the nature of the work to be done.

"System is composed of interdependent routines."[30] A routine is defined by Webster as a "regular habit or practice," or more specifically, as a "course of business or official duties regularly pursued." In business, a single routine is a standard practice or way of performing some function or of handling some transaction. To quote Davis further:

> System has been defined as the normal routine by which the operations of the business are carried on and controlled. . . . As far as possible, the system should be the result of a steady homogeneous growth of routine developed through the consistent application of methods of scientific analysis. . . .[31]
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> Before the system can be stabilized sufficiently to enable the organization to become thoroughly familiar with it and skilled in its use, the basic factors in manufacturing which affect the system must be standardized.[32]

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[28] J. E. Otterson, "Executive and Administrative Organization," in Daniel Bloomfield (ed.), *The Modern Executive* (1924), p. 43. By permission of The H. W. Wilson Company, publishers.

[29] From Norris A. Brisco, *Economics of Business* (1920), p. 81. By permission of The Macmillan Company, publishers.

[30] R. C. Davis, *The Principles of Factory Organization and Administration* (New York: Harper and Brothers, 1928), p. 86.

[31] *Ibid.*, p. 74.

[32] *Ibid.*, p. 79.

The first step in building a system is, therefore, the determination of standards based upon a scientific analysis of the elements of each unit of work. Upon such standards, routines of procedure are established; these routines are then combined into systems. In this manner every individual unit of work is tied in so that all serve harmoniously and effectively toward executing the policies and accomplishing the objectives of the industry.

The most significant applications of routines and systems have been for the purpose of facilitating the work of management itself by relieving it of much of the task of detail supervision and petty decision making. Most of the regular work of a modern industry is governed in its performance by the technological considerations involved in each particular type of work, even clerical work is becoming largely a matter of machine operation, and with time and motion study all manual labor tends to become standardized. Until recently the work of pure management has evaded all attempts at standardization. Scientific management, however, has now turned upon the higher phases of management the forces of scientific analysis and synthesis, and the result is that much of this work can be standardized. Systems can be developed that handle perhaps the vast majority of transactions more accurately than could any single person giving the matter his entire attention. According to the "exception principle," all exceptions to the general rules, routines, and standards should be pointed out by the workmen or clerks, thereby leaving the manager free to devote his attention only to those things which particularly need it.[33] Thus Wissler describes the process of systematization of management work as follows:

> It is, of course, true that routine, however well designed and constructed, must always lag executive extensions of managerial function. Managerial initiative constantly enlarges the field of function, constantly refines it and so leaves it more complex. Yet as fast as these refinements become integrated in the continuous functioning of the enterprise or any of its component parts,

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[33] See F. W. Taylor, *Shop Management* (New York: Harper and Brothers, 1911), p. 26.

> they should be handed over to routine so as to assure their constant automatic operation and to release executive attention and resources for the handling of still further refinements.
>
> Thus in a way does management continuously consolidate itself by a sort of mechanization to which standardization and simplification are the logical preliminaries. The natural line of evolution in the perfection of business administration is in the direction of routinization; as rapidly as is safe the manipulation and control of function should be handed over to routine. Today good management is measured by the degree to which specific executive decision can be dispensed with rather than by the degree of brilliance and success with which executive personnel may steer—as by so many emergency rescues—the business craft.[34]

Thus, routines and systems are merely forms of organization of work. The principle is the same here as elsewhere, namely, that every individual performance should be reduced to its elements, be these elements therbligs or items of technical knowledge, and that these elements should then be combined with others, to form convenient units of work, and the units so combined that the entire work of the enterprise is thoroughly integrated and organized. Even the work of management itself is susceptible of the same scientific process of analysis and synthesis. It too may be routinized, charted, and codified under the general headings of principles and policies. It is only after the work which any industry is to do has by this method been thoroughly understood that the work of constructing a scientific organization of personnel can be commenced.

FUNCTIONS

Before concluding the organization of work, an attempt should be made further to clarify and distinguish several concepts commonly used in management and organization literature. Such terms as operations, procedures, processes, systems, and functions are too often used more or less indiscriminately. The reason for such a situation is that these terms relate to one whole of activity, not to separate or unrelated phenomena. It is only for purposes of study and description that they must be treated as separate problems and studied apart.

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[34] Willis Wissler, *Business Administration* (New York: McGraw-Hill Book Company, Inc., 1931), pp. 747-748.

In the synthesis of work it is necessary to visualize the total work to be accomplished as made up of small units of work. This total of work accomplished, ordinarily called "the productive process," is divided into stages, each designated as "a process." Processes are likewise divided into stages or steps, designated usually as operations, and operations are in turn divided into performances, or elementary units of work. Processes, operations, and performances refer to work accomplished, and should be distinguished from systems, routines, and procedures, which relate to the particular methods of doing the work. Both process and system refer to the work to be done, but while process relates to what is done, system relates to how it is done. A system, then, refers to the method of doing certain work. It is usually thought of as being divisible into several well-defined and established procedures or routines, as they are variously called. Usually a certain process demands a certain system, and usually a certain system will produce a certain process, the two terms relating therefore always to the same thing. However, this is not always the case; certain processes may be accomplished by either of two or more different systems or procedures.

The term "function" is such an overworked word in the vocabulary of organization and management literature that a definition based upon common usage is practically impossible to determine. This term is defined in the following chapter to relate to the activities of the personnel in its performance of work,[35] the usage which seems to be most common in this field. However, "function" is often used to refer to work done, rather than to the activity of some organ or agency in doing that work, and "a function" to a part or subdivision of this work. Accordingly, the total work done by an enterprise is divided into a small number of main functions, which may in turn be divided into subfunctions, and so on. In such a division, functions or subfunctions

[35] *Vide infra,* Chap. IV, *s.v.* Bases of Departmentalization.

are often found to be coterminous with processes or with systems of work. As a matter of fact, in organizing scientifically an attempt is always made to match processes, or definite units of work to be accomplished, with certain definitely established units of activities of personnel performance, or functions.

A function in this sense, which may be distinguished as an "organic function," means a group of related activities constituting an interdependent unit of the total to be performed, the purpose of which is the accomplishment of some particular object essential to the complete production process. A function is by nature organic and mutually dependent upon other functions; it cannot therefore stand alone or be separated from other functions and conducted as an independent unit. It is distinguishable from a process in that processes are united in the production program usually in sequence; that is, one process must be completed before another is begun. Functions are not united in sequence or series, but in parallel, as it were, for all functions must be to some extent contributing their services in the production program at the same time. The activities of each function are commonly united and identified as a certain system, the object of which being designated as a certain service.

The confusion in regard to the meaning of function and functionalizing arises whenever an attempt is made to divide the total activities of a concern into a few definite and fully differentiated main functions. The cause of the confusion is that the basis for dividing up the activities differs in each case; and consequently there is a lack of uniformity in the resulting functions. This may be illustrated by a few examples. According to McKinsey: "The term function is used in business administration to refer to a group of homogeneous activities leading to a common objective."[36] He thereupon divides the activities of a concern into five main functions as follows: marketing, production, personnel, finance, and standards and records.[37] According to Gerstenberg, however: "A functional division of the activities of any business leads to the formation of the four 'basic' departments—financial, production, sales and accounting."[38] Another author finds that: "The three primary functions of a manufacturing business are *production*, *distribution*, and *administration*."[39] Still another notes five organic functions in a manufacturing industry: these five organic functions are design, equipment, control, comparison, and operation.[40] A list of eight functions is also found, these are: analyze, initiate, plan, promote, direct, coordinate, maintain, and measure.[41] Finally, another speaks of "six essential functions," which are: technical, commercial, financial, security, accounting, and administration.[42]

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[36] James O. McKinsey, *Business Administration* (Cincinnati: South-Western Publishing Company, 1924), p. 38.

[37] See *ibid.*, pp. 39 ff.

It is therefore apparent that a variety of opinion exists as to what constitutes a function, or the main functions, of an enterprise. The reason for this disagreement is simply that there are many bases for determining homogeneity in activities or in differentiating objectives and that there are many ways in which the total work to be done by an enterprise may be divided. A complete reconciliation of these various classifications is consequently impossible.

Perhaps a better classification of functions, regarded as divisions of the work to be done, may be based upon the agencies or organs performing the functions. A function may then refer to the activities concerning a certain productive factor or organ, rather than to a group of homogeneous activities of personnel performance, the basis of the homogeneity being that of knowledge, aptitude, or skill. The relationship of organs and functions has been explained as follows:

> That *organ* is the correlate of *action* is implied in the derivation from the Greek word for that with which one *works*. This goes back to the biological correlate, *func-*

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[38] Charles W. Gerstenberg, *Principles of Business* (4th ed.; revised; New York: Prentice-Hall, Inc., 1926), p. 208.

[39] Henry P. Dutton, *Business Organization and Management* (Chicago: A. W. Shaw Company, 1926), p. 22.

[40] See A. Hamilton Church, *The Science and Practice of Management*, pp. 28 ff.

[41] See Percival White, *Business Management* (New York: Henry Holt and Company, 1926), p. 97.

[42] See Henri Fayol, *Industrial and General Administration* (London: Sir Isaac Pitman and Sons, Ltd., 1930), p. 9.

> *tion,* which too may be defined in terms of *action* or *working*, and which is the source of several extended meanings. An organ is thus a bodily structure particularly adapted to some special function. . . . [43]

An organ, or "that with which one works," finds its nearest equivalent in a business establishment as a productive factor, or as an ingredient of work.

In organizing or synthesizing the work of an entire industry, as of a single performance or operation, account must be taken of the necessary ingredients or productive factors, whether or not these form the basis for establishing the organic functions or the major departments. This is recognized by Fernstrom and others as follows:

> Any endeavor may be said to be comprised of the *functions* of planning, procuring, performing, disposing, evaluating, protecting and improving. Thus, if business enterprise be taken as the unit of endeavor, its primary functions are: administration, procurement, manufacture, distribution, comptrolling, law and research.
>
> However, it is impossible to determine completely the constituent activities of any enterprise without finally taking into account the productive agencies furnished by land, labor and capital. These facilities as set forth by Going are: money, men, machines, methods and materials.[44]

To Going's five "M's," however, are usually added three others to complete the list of productive factors. These are: markets, motive power, and management. Any classification of the productive factors in a system is, of course, more or less arbitrary. The classification according to land, labor, capital, and entrepreneur is not particularly serviceable for modern business purposes and is seldom utilized. The classification according to these eight "M's" is perhaps more serviceable than any other and more often followed in industrial organization. This seems to be the basis that usually results in the so-called organic functions.

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[43] Henry E. Bliss, *The Organization of Knowledge and the System of the Sciences* (New York: Henry Holt and Company, 1929), p. 74.

[44] Karl D. Fernstrom, *et al., Organization and Management of a Business Enterprise* (New York: Harper & Brothers, 1935), pp. 188-9.

An explanation of each such factor, ingredient, or organ will indicate, therefore, its nature, its importance, and its serviceability as a basis for dividing and grouping the work of an enterprise, and for establishing the main operating departments.

By markets, as a factor or ingredient in production, is meant the knowledge concerning the product to be made or the service to be rendered. This includes fundamentally the information furnished by market analysis and research as to the design and specifications of the product, and all information as to quality, quantity, price, and market conditions. In present-day industrial production first consideration must be given to the market, or to the customer and his needs and ability to buy, in order to know what to make. This activity, known as market analysis, is necessary before another step can be taken in establishing a business enterprise. In an established business the function of markets or marketing is ordinarily performed by a specialized group organized as the sales department.

The factor, money, needs perhaps little explanation. This factor in a pecuniary society constitutes the means of commanding all other factors. It involves not only the procurement and the possession of funds but also the handling of credit and credit instruments, financial and accounting records of all kinds, and the activities concerned in evaluating in terms of money the various elements entering into the productive process. It is to be distinguished from physical equipment or capital goods. The work involved in connection with this factor is usually organized to constitute a financial, an accounting, or a comptrolling department.

The factor designated as methods is not always regarded as separate and distinct from the factor designated as man. However, as previously indicated, recorded technological knowledge of methods concerning how things are done can now be treated as a fully differentiated factor. This factor may be produced systematically by research and experiment, it may be stored in files, books, museums, etc., and it may be protected by patent and copyright. The nature and the importance of this factor as an economic resource is duly recognized by Dr. Zimmermann in the following passage:

> It is deposited in books; it is described in mathematical and chemical formulas. These, in turn, are disassociated from personal carriers of the arts. The introduction of science, in other words, means above all the depersonalization of that upon which human progress rests. The highest expression of science is the mathematical formula. Especially when deposited in written or printed forms, the tenets of science, the facts and relationships discovered and expressed in mathematical formulas become the almost universal and indestructible property of mankind.[45]

The responsibility for providing and making available this factor is ordinarily assigned to a research or planning department or function.

The factor, machines, should be more properly designated as fixed assets or equipment. It includes land, buildings, machinery, tools, furniture, and fixtures. Activities concerned particularly with this factor are usually grouped to form a plant or engineering department, which is ordinarily placed in the production department as one of its subdepartments.

Materials as a factor includes not only raw materials, as they are commonly called, but also supplies and accessory materials of all kinds. A purchases and stores department is usually organized to perform all activities concerning this factor. These activities include not only purchasing and storing but also traffic, or the movement of the goods, and sometimes inspection. This department sometimes forms a subdivision of the production department.

Motive power is merely an alliterative term for physical energy. Energy or power, however, is not always regarded as a factor apart from other factors, either man, machines, or materials. Nevertheless, the growing utilization of energy or power in modern industry and the absolute dependence of industry upon it force a recognition of this factor in every productive operation. It is certainly no longer to be associated with man or labor as a source: "Productive efficiency rests on functional specialization; and using man as a means of physical energy instead of as the director of natural forces is the most flagrant violation thinkable of the principle of specialization."[46] Activities relating to energy are commonly entrusted to the care of a functional or staff electrical engineer, or if the concern produces its own energy, to a power plant department, a subdivision frequently of the production department.

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[45] Erich W. Zimmermann, *World Resources and Industries* (New York: Harper and Brothers, 1933), p. 34.

The factor, man, labor, or personnel, is well recognized as a productive agency. It is comprised of man with all the particular attributes that fit him for his respective job or function. In well-organized establishments a personnel function or department is instituted to supply and maintain this factor. Scientific management has placed particular emphasis upon man as a factor in production and as an integral part of the management mechanism, and it insists upon the provision of special facilities for enhancing the productivity and welfare of the workers.

The final factor, management, is merely the factor that coordinates the activities concerned with the other factors. It may be regarded as including all other ingredients of the productive process not herein singled out and recognized as differentiated factors.

The work of an enterprise may be thus divided according to productive factors each regarded as an organ and the activities concerning it as a function which may constitute the work of a department. It is a division of this kind that is often described as functionalization. However, as will be explained below, functionalization may also refer to a grouping of activities according to similarity in skill of performance, and for the purpose of the control of personnel. For example, the function of a chemist, or of chemistry, may cover all activities concerned with chemical equipment, chemical materials, chemical energy, and chemical methods, thus cutting across departmental units based upon productive factors or organs.

As the present chapter has been concerned with the nature of the work to be done, its constituents and its organization, the next chapter will quite logically consider the nature of human effort and its organization for performing this work. These two aspects of organization, though studied separately for purposes of analysis and clarification, must be considered together in planning an actual organization. Too often one of these phases of organization is studied and conclusions reached without proper regard for the other.

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[46] *Ibid.*, p. 61.

CHAPTER IV

ORGANIZATION STRUCTURE

DEFINITION AND METHOD

Structure, to put it briefly, means the manner of building, or the arrangement of parts in a body. In the field of industrial administration, when these parts consist of physical plant and equipment, and the arrangement is a matter of spatial relationships, the structure is usually described by such terms as "building construction," "plant layout," or "localization." When the parts consist of elements of work, operations, or steps in the production process, and the arrangement has largely to do with sequence and timing in addition to space and other relationships, the structure is ordinarily described as the "system," or referred to as the organization of work, or as the productive process. And, when the parts consist of individual workers and groups of related workers, all specialists and executives included, and the arrangement is concerned with matters of duties, authority, responsibility, advice, and the coordination of human effort, the structure is designated as a matter of "organization." By organization structure, therefore, is meant the relationships of the workers and their activities to one another and to the whole, the parts being the tasks, the jobs or the functions, and the respective members of the personnel who perform or control them.

The word "organization" is often used to include both layout and system as well as the structure of the activities of the personnel. Since these aspects of organization are taken care of by other terms, "organization" may be confined to the narrower meaning, it being remembered, of course, that neither layout, system, nor organization are separate and independent functions but merely different phases or aspects of the larger problem of constructing a "going concern" in its entirety.

After the objectives of an enterprise have been determined and translated into terms of particular products, certain processes then become imperative on account of the technical nature of the product. These processes, in turn, dictate certain physical equipment and certain technological knowledge and skill as being essential to the proper performance of the process. The equipment once installed becomes then, for short-run purposes at least, a fixed factor in the enterprise and demands itself certain procedures and systems, and certain qualifications of the members of the personnel. Thus, a rearrangement of equipment may necessitate a modification in the system, or an improvement in system may necessitate different equipment, either or both of which will probably necessitate a reorganization of personnel. Likewise, changes in personnel or in the conditions of work and employment may require an improved plant, a better system, or both. In developing the structure of an organization, the assumption must be, therefore, that the layout and the system have each been previously taken care of, that they may be adapted to the organization, or that they at least stand as constant and known factors of the problem at hand.

Organization structure, or the arrangement and the relationships of workers and executives with one another and with the whole as an organic unity, is determined, therefore, by the work to be done, by the equipment and facilities for doing it, and by certain psychological laws and general principles of human conduct.

The chief relationship of the members of an organization, one with another, is a work relationship, that is, a relationship determined by the work each performs. As Mr. Dennison says: "Organization engineering has first to discover within any given group the prevailing conditions and develop its forms of organization and general operating measures so as to accommodate itself to them."[1] And he states further that: "Structure must in any case be flexible, not rigid, and specific measures will usually have to be taken to help it remain so; it must strengthen its group, not ossify them."[2]

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[1] Henry S. Dennison, *Organization Engineering* (New York: McGraw-Hill Book Company, Inc., 1931), p. 4.

Thus, organization structure should follow the system of work; or, in other words, the main lines of division in any organization should be determined primarily by the organization of the particular work process. General-purpose organizations, therefore, like the general-purpose factory building, stand in violation of sound principles of organization and efficiency. The structure of both should be based upon the particular work to be done and the work relationships inherent in the particular productive processes. The most fundamental relationships are those of one job with another in the system of work; matters of authority and advice then follow as supplements and corollaries of the organization of work.

The present method begins, accordingly, at the bottom with the individual items of work, and gradually evolves the most suitable structure. Such a method or procedure differs to some extent from that usually followed, which begins with the total work to be done by an organization and attempts to divide this work into a small number of organic functions, and these functions into subfunctions, and so on until the work of the individual laborer is finally reached. This method begins at the top and proceeds downward to and through the rank and file. It is, no doubt, the simplest and clearest for the purposes of describing an organization; but it must necessarily begin with certain assumptions as to functions without first completely analyzing the work to see how the various activities tend to group themselves. Consequently, its lines of division between functions or departments are often arbitrary and ill-adapted to the work. The present method, on the other hand, completes the analysis in detail of the entire work of the enterprise before the first step in synthesizing is undertaken. It begins at the bottom and by addition, instead of by division, gradually evolves the structure of functions and departments, from the nature of the work and the facilities for doing it. Although it may often happen that both methods if scientifically employed lead to the same result, producing identical groupings or divisions, yet a structure founded upon the one method will grow and accommodate itself to the needs of the work process while the other is likely to remain fixed until overthrown by a new management and a "reorganization."

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[2] *Ibid.*, p. 126.

Although the procedure of organizing as developed here is the idealistically correct procedure as it may be conceived in planning the structure of a totally new organization, it would have little usefulness in practice. It is seldom that an organization of any considerable size is developed entirely new from top to bottom. Most organizations are developed gradually over a period of years as the needs arise. The process of organization and reorganization goes on continuously in a going concern, one part, function, or division after another being modified and re-formed as conditions and facilities necessitate. The correct procedure from the practical point of view is, therefore, to begin the process of organizing wherever and whenever the need for better organization structure becomes manifest, whether at bottom, middle, or top. Hence, should the chief executive encounter difficulties in properly delegating duties and responsibilities, he should instantly examine the top strata of his organization structure for possible relief. In fact, Professor Gulick suggests that it may be even more correct to begin the process of organizing at the top and at the bottom simultaneously and to work downward and upward from each point respectively, the two structures meeting somewhere in the middle, there to be finally adjusted to one another in the face of problems and facilities then existing.[3]

A study of organization structure, therefore, properly begins with an analysis of the work to be done by the particular organization. Such an analysis should begin, as in the study of the organization of work, with the determination of the basic unitary elements of work. As seen above, the only elemental unit of human effort so far derived and adequately standardized is the therblig, or one simple movement of some part of the body. In operation and process building the therbligs, as well as the machine performances, were studied from the standpoint of the completed work accomplished by them. In organization building, on the other hand, the therblig is studied from the standpoint of the human effort expended and the effect on the persons expending it, just as in engineering, machine performances are studied from the standpoint of the effect on the machine, its efficiency of output, power utilized, possibility of breakage, etc.

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[3] See Luther Gulick, "Notes on the Theory of Organization," in Luther Gulick and L. Urwick (editors), *Papers on the Science of Administration* (New York: Institute of Public Administration, Columbia University, 1937), pp. 11-12.

The basic data upon which the science of organization must build is furnished by the science of motion study. Motion study, as seen above, begins by dividing *work* into the most fundamental elements possible, and then uniting these elements with others to develop the best structure of work elements. It involves machine work as well as human work, for as Gilbreth has said: "From the Motion Study standpoint there are not always clear dividing lines between the *operations of devices* and the *mental and manual operations of the human being*, for they are often mutually interchangeable, sometimes in part and sometimes as a whole."[4]

According to present purposes, however, as soon as a human motion can be replaced by a machine motion, that motion becomes a matter of engineering. The science of organization deals, primarily, only with human motions; it is a branch of the larger subject of management, which Gilbreth distinguishes as follows: "The science of Motion Study consists, therefore, of finding The One Best Sequence of therbligs for each kind of work and the science of management consists of deriving, installing and enforcing the conditions that will permit the work to be done repeatedly in The One Best Way."[5]

The science of organization consists in taking the best sequence of therbligs and the best conditions for doing work and so relating and combining them as to compose first the individual jobs, and then the organic functions and departments which go together to comprise the total of activities performed by the entire personnel of the enterprise.

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[4] Frank B. Gilbreth, "The Classification of Work," in The Society of Industrial Engineers, *Reducing the Cost of Business* (Convention Proceedings, Vol. VII, No. 1, September, 1924), p. 108.

[5] *Ibid.*, p. 109.

OPERATION STUDY

The process of organization synthesis begins, therefore, with the therblig as the atom of job structure. Therbligs are grouped first into cycles, cycles are then grouped so as to form complete operations, and operations are combined so as to constitute the tasks and the jobs of individual workers. Individual jobs are then united with others to compose processes, departments, and functions, and so on until every item of human effort in the enterprise is fully utilized and coordinated. As Gilbreth describes the procedure: ". . . the seventeen sub-divisions, or events, or therbligs, as they are variously called, seem to be all that are necessary from which to synthesize all the *cycles of motions* of all the *operations* of all the *processes* of all the *organizations* of every kind whatever."[6]

The process of synthesizing, or organizing the activities of the individual workers, follows the same method of procedure as synthesizing work, that is, beginning with the smallest elemental unit of work and combining these units into ever larger and larger units until every element is fully coordinated so as to enhance in some way the productive process.

Through motion study, sixteen, at least, of the seventeen therbligs have been reduced to the simplest of movements, requiring a modicum of skill and knowledge in their performance. These therbligs tend to become standardized as to time, or speed of performance, and, to a large extent, as to cost. They may be counted in any operation, compared with identical therbligs in other operations, and thereby established as definite units of performance throughout all industry. The therblig *use* must, of course, differ in different operations. It is this therblig that chiefly distinguishes each operation and each trade or type of skill. It differs both as to the technological knowledge required and the skill employed in its performance. To quote again from Gilbreth:

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[6] *Ibid.*

> It should be recognized that the therblig USE is the difficult one to learn in mastering a trade. It is the most productive and therefore the most important therblig of all.
>
> All other therbligs of all kinds of work are desirable and necessary only so far as they facilitate, prepare for or assist in increasing USE. Any therbligs that do not foster USE should be under suspicion as being unnecessary. USE is the highest paid therblig, because it usually requires the most skill. The more of the therbligs of "get ready" and "clean up" that are performed by less skilled and consequently lower priced workers the better for all workers, for they all will be employed a larger portion of the day at the highest priced work at which they are each individually capable. This is true not only in the consideration of the therbligs but also in the trades in general.[7]

The therblig is regarded as an elemental unit of work to be accomplished—one of the elements of performance necessary to the productive process—and as a part in the organization of work. In order to translate it into terms of human effort required or expended, the conditions surrounding its performance and affecting the worker must be included. If the therblig is to be established as a standardized unit of work, any variation in its speed, quality, or cost must, then, be regarded as due to the surrounding conditions. That is to say, the task of the worker is the therblig *multiplied by* the conditions under which the therblig must be performed.

A complete list of all such conditions affecting the performance of therbligs could, of course, never be made; but, as data are collected and analyzed, such a list may be approximated. Gilbreth's compilation of all such conditions, which he designates as the "variables of motions," include the following:

A. Variables of the Worker:
(1) Anatomy, (2) Brawn, (3) Contentment, (4) Creed, (5) Earning Power, (6) Experience, (7) Fatigue, (8) Habits, (9) Health, (10) Mode of Liv-

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[7] *Ibid.*, p. 112.

ing, (11) Nutrition, (12) Size, (13) Skill, (14) Temperament, (15) Training.

B. Variables of the Surroundings, Equipment, and Tools:

(1) Appliances, (2) Clothes, (3) Colors, (4) Entertainment, Music reading, etc., (5) Heating, cooling and ventilation, (6) Lighting, (7) Quality of material, (8) Reward and punishment, (9) Size of unit moved, (10) Special fatigue-eliminating devices, (11) Surroundings, (12) Tools, (13) Union rules, (14) Weight of unit moved.

C. Variables of the Motion:

(1) Acceleration, (2) Automaticity, (3) Combination with other motions and sequence, (4) Cost, (5) Direction, (6) Effectiveness, (7) Foot-pounds of work accomplished, (8) Inertia and momentum overcome, (9) Length, (10) Necessity, (11) Path, (12) "Play for Position," (13) Speed.[8]

The performance of the therbligs under the existing conditions, or subject to these variables, thus constitutes the tasks of the individual workers. The therbligs are dictated by the nature of the work to be done; the variables are the result of the particular facilities for doing the work and the work environment. It is the object of good management to modify and to control these conditions so that the performance of the required therbligs is facilitated in every way possible; and, until all such conditions are controlled and standardized, standard tasks of workers cannot be established. As Dean Kimball has said:

> It will be obvious that standard performances, however carefully prepared, cannot be realized unless all the conditions under which the operation is performed are also standardized and do not vary materially. A lathe cannot be expected to make the same performance with a slack belt as with one in prime condition, nor can the worker produce good results if he is surrounded with adverse conditions. Operation analysis, therefore, to be intelligent, must consider the operation, the workman, the production center, and its surrounding conditions.[9]

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[8] *Ibid.*, pp. 107-108.

[9] Dexter S. Kimball, *Principles of Industrial Organization* (3rd ed.; New York: McGraw-Hill Book Company, Inc., 1925), p. 173.

With the advancement of the science of management, however, even these so-called variables are being reduced to known quantities and subjected to standardization.

Motion study not only has provided standardized therbligs, but it has gone further and provided standardized groups of therbligs, or cycles of motions. Gilbreth defines them as follows:

> Cycles of motions are arbitrary sub-divisions of operations. They have distinct and natural boundaries of beginning and ending. Usually and preferably there are certain sequences of therbligs that are especially suitable for standardization and transference to other kinds of work, and serve every purpose of finding The One Best Way to Do Work.[10]

In other words, there are now standard cycles of therbligs which may compose parts of quite dissimilar operations. Through motion study many a performance long thought to be no less than an art within itself has been found to consist of nothing more than a simple cycle of motions used constantly in numerous operations. The best cycles having once been discovered and standardized, it becomes then an easy matter to reduce other performances to one or more of these best cycles. According to Gilbreth:

> It was early recognized that certain similar operations have similar sequences of therbligs. For example, the operations of feeding pieces into a drill press or into a punch press, time tickets into a time stamp and paper into a printing press have practically the same sequence of therbligs. A typical sequence of therbligs for one complete cycle of handling one piece on a drill press is *Search, Find, Select, Grasp, Transport Loaded, Position, Assemble, Use, Dis-assemble, Inspect, Transport Loaded, Pre-position for Next Operation, Release Load, and Transport Empty*. This cycle of motions can and should be done with the following therbligs: *Grasp, Transport Loaded, Position, Assemble, Use, Release Load,* and *Transport Empty*, which are half the number of therbligs of the usual method.[11]

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[10] Frank B. Gilbreth, *op. cit.*, p. 109.

[11] *Ibid.*, p. 111.

The next step in job synthesis is to combine cycles of therbligs so as to constitute complete operations. In some cases, as seen above, one cycle of therbligs may be all that is necessary to complete an entire operation. In most cases, however, a complete operation is somewhat more complex, requiring several cycles of therbligs and possibly a few occasional duties not always standardized or included within any standard cycle and for which time allowances may be made. The operation, whether simple or complex, constitutes a most convenient unit in the synthesis of workers as well as in the synthesis of work, for it marks a point where the two may be conjoined and thereafter identified together. The operation in addition to being a definite measurable quantum of work useful in system and process building is a unit large enough in many cases to become the chief activity and responsibility of some person. Its complete description may be contained on an instruction card which the worker is taught to understand, and for the execution of which he may be held accountable. The operation is the activity of a production center, a piece in a piece-wage system, a common unit of output, and an essential unit for cost and financial purposes. Scientific operation study involves, to some extent, therefore, the entire plant, as Anderson observes:

> Operation study involves an analysis and standardization of all factors influencing the doing of a task, the development of the best method of performance, and the determination of the time required. The aim of operation study is to make the manufacturing establishment in its entirety most effective; to insure that the personnel, buildings, equipment, operating and auxiliary departments are suitable for the work to be done, and function to advantage. . . . Operation study is the foundation of good management.[12]

Operation studies have suceeded in standardizing a large number of complete operations involving several cycles of therbligs. A chief variation in the different operations is usually found, as stated above, in the therblig *use*. It is the particular nature of this therblig that distinguishes and characterizes the particular operation in which it may be contained. The instruction card for each operation, however, provides the technical knowledge needed in its performance and serves as the standard chart and manual describing the operation. Each operation requires also certain skill and dexterity on the part of the operator, which must abide, of course, in his experience and training, and of which a description should be contained in his respective job specification. It is this particular skill that forms the basis of the trade or occupational classification of the workers, which also tends to become standardized in the movement toward trade unionization. As the conditions surrounding the performances become standardized and controllable it becomes possible then to establish operations completely standardized both as a unit of work and as a task for the worker. Indeed, the work of operation study is never complete until every operation in an enterprise is defined in terms of standards comparable from industry to industry wherever that operation is required.

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[12] Arthur G. Anderson, *Industrial Engineering and Factory Management* (New York: The Ronald Press Company, copyright 1928), p. 346.

Before closing this section of the discussion, it should be noted that this procedure of organization is by no means bound to or dependent upon motion study. Motion-study technique is employed here chiefly as a means of illustrating the process of organizing because it is the most thorough and scientific technique for analyzing and synthesizing work yet developed in modern industry. Its particular application is to manual work, but even here a complete or thorough motion study is not always practicable or even necessary.[13] In many instances it is sufficient for practical purposes if workers and executives become only "motion-minded" with respect to the work of the organization.[14] Moreover, in small enterprises and in those performing work of infrequent occurrence or of a temporary nature the expense of a thorough motion study cannot be justified financially.

However, the fundamental idea of developing a science of human work by analyzing and studying every element that affects this work is essential to the scientific development of organization structure. It is basically the same idea manifest in the manuals for training salesmen, in which the novice is instructed to memorize virtually his entire "sales talk" as the conversation with his prospective purchaser. During his apprenticeship, supervisors will observe the young salesman to see that he repeats his script accurately and with cheerfulness and enthusiasm. Thus there is built up a synthesis, word by word as it were, of the elements of the work that the salesman must perform.

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[13] See Ralph M. Barnes, *Motion and Time Study* (New York: John Wiley and Sons, Inc., 1937), Chap. III.

[14] See *ibid.*, pp. 40-41.

JOB SYNTHESIS

The standardization of operations is the last step in motion study and the preliminary step to job standardization. An operation, as defined above, is a completed step in the production process, regardless of who or what performs it. It may constitute the entire work of an individual, only a part of his work, or the work of several individuals. "A *job* or *position*," however, "is a group of duties, responsibilities, and activities assigned to one individual."[15] It will usually be the purpose of scientific organization to adapt jobs so as to fit the limits of one complete operation and any facilitating duties essential to its performance. The combining of therbligs and cycles so as to compose operations was determined chiefly by the nature of the work to be done, leaving, as the adaptable factor, the worker. The combining of individual tasks, or the separate and distinguishable duties of a worker so as to form a job, is determined also primarily by the technical nature of the work, but more fundamentally by the human and psychological nature of the worker. In job building the aim is to utilize fully the capacities of every worker and to make workers, or jobs, as few as possible. Jobs must be adapted, therefore, to the work and to the worker so that both maximum efficiency and well-being are promoted.

The individual job serves, therefore, as the keystone in organization structure. In it are brought to a focus all the elements of the organization, including the work, the worker, the facilities for doing the work, and all conditions surrounding and influencing the job. Job studies are equally concerned with the process itself and with the relation of the worker to the process; they constitute common ground, therefore, for both industrial and personnel management. As Tead and Metcalf have written:

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[15] Ordway Tead and Henry C. Metcalf, *Personnel Administration* (3rd ed.; New York: McGraw-Hill Book Company, Inc., 1933), p. 235.

> . . . the whole effort and objectives of job analyses are such that this work stands uniquely at *the vital cross-roads where technical and personnel factors and influences meet and interpenetrate*. . . .
>
> If the management wants interest in work, if it is dissatisfied with quality or feels itself cheated on the quantity of work done, *the place to attack these problems is at the job itself where study and common knowledge can supply the basis for agreement and joint action of managers and workers.*[16]

Upon the information furnished by job analyses it is possible to establish completely standardized jobs. Where standard operations and conditions have been provided it becomes a relatively easy matter to establish standards for the complete job by merely adding together the standardized ingredients. Where such standards do not obtain, the standard job can be only approximated by establishing average time allowances, maximum errors, and other tolerances. In any case a clear description and definition of the tasks and the responsibilities called for make it possible to give the job definite objective limits, making of it something more than merely the customary activities of the job holder, whatever they may be. The standard job, like the standard operation, should be measurable as to quantity and quality of output and as to costs, both direct and indirect. Jobs thus determined and standardized are necessary for scientific organization planning. "If a plan of organization is to be highly effective it must be specific and concrete, clearly defining the duties of each individual and coordinating every effort toward the ultimate objective."[17] Or, according to Westbrook: ". . . the functions, or specialized duties performed by individuals or departments must be laid out or planned for the organization as a whole and adopted as standard so that each functional activity will fit in with all the others in such a manner as to result in a smoothly running whole."[18]

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[16] *Ibid.*, p. 237.

[17] John R. Bangs and C. D. Hart, *Factory Management* (Modern Business Series; New York: Alexander Hamilton Institute, 1930), p. 55.

Through job analyses is provided also the information for job specifications, which describe in detail the qualifications needed by the person who is to hold the job. These specifications are used in first selecting and training the worker and afterwards in rating him for promotion. Whereas the job standard describes the job in terms of the work to be done, its duties and responsibilities, the job specification, based upon the job standard, describes the necessary and the desired attributes of the respective job holder. Job specifications furnish the means, therefore, of securing for the standard job the respective standard worker.

Through the dissemination of job-study information it becomes possible to standardize the vast majority of all industrial jobs requiring chiefly manual labor. Jobs requiring chiefly mental labor have been attacked also by motion study, but as yet no elemental unit of mental effort such as the therblig has been developed. However, the line between manual and mental effort is none too finely drawn, and the methods employed in studying the one have often proved useful in studying the other. As Dr. C. S. Myers has said:

> The border line between the physiology and the psychology of work is obviously very ill-defined. In the first place, all occupational movements demand skill; even a dustman's work is to some extent skilful, for there are good and bad methods of doing it. And the acquisition of skill lies clearly in great part within the domain of psychology. In the second place, all mental work involves or is accompanied by some muscular activity, and is influenced by such physiological factors as lighting, temperature and ventilation. Thirdly, both muscular and mental work are dependent on such mental factors as interest, temperament and incentive, and by such more purely physiological factors as fatigue, food and sleep.[19]

[18] Francis A. Westbrook, *Industrial Management in This Machine Age* (New York: Thomas Y. Crowell Company, 1932), p. 38.

[19] C. S. Myers, "The Physiology and Psychology of Work," in The British Association for the Advancement of Science, *Business and Science* (London: The Sylvan Press, 1931), p. 115.

The jobs of skilled artisans and specialists can be accurately described in terms of duties and responsibilities, but they cannot usually be subjected to exact measurement in terms of specific tasks or units of output. They, being as few as possible, must be left for the ascertainment of results somewhat to the discretion of the job holders and of the executive officers. These jobs, as well as those of junior executives, may often include certain standard tasks along with certain time allowances for the work of research, advice, or supervision. The jobs of line executives must include, in a way, the duties of all jobs to which they are supervisory in addition to the task of coordination and control, making them theoretically coextensive with the work of the entire group or department supervised. The duties of functional and staff officers cover all work pertaining to their respective functions or processes, regardless of by whom they may be actually performed. The responsibility for the actual performance of such duties is, of course, delegated entirely to the workers, leaving only the duties of coordination, instruction, and general supervision as the particular tasks of the official positions.

Jobs of all higher officers should not, and really cannot, be definitely standardized in terms of specific tasks, for these are by nature positions relieved of all work of a routine character in order to allow ample time for concentration upon exceptions to routine, emergencies, and matters of greater consequence. In other words, the higher officers should have no standardized tasks to perform themselves; as soon as a duty can be definitely defined and routinized, it should be placed within the sphere of some inferior job. It is only by consciously stripping the higher jobs of all minor tasks that artistry, ingenuity, and creative thinking are invoked or even made possible. Job manuals and standard practice instructions should be definite and clear-cut in defining functions, responsibilities, and group objectives; but in no case should job standardization proceed too far up the official hierarchy and attempt to force the performance of ordinary or routinized tasks upon those who occupy executive positions.

After all jobs in an industry have been fully defined and their respective job specifications prepared and, so far as practicable, standardized, it is then possible to classify and to grade both jobs and job holders. Job or position classification and grading are defined as follows:

> A *position classification* is a statement of the grouping of the positions in an organization under class designations in such a manner as to show that positions are related to each other by similarities of duties, responsibilities, or workers' qualifications.
>
> The work of *job* or *position grading* is the effort to establish for all positions in an organization their relative place in the hierarchy of jobs from the point of view of their comparative importance without regard to the specific duties involved.[20]

By thus classifying all jobs in an organization according to the types of activity and the qualifications of workers needed in their performance, and then grading them according to their relative worth or position in the salary scale, the science of organization is provided with definite and standard units with which a structure may be built. With jobs thus standardized and classified the on-paper organization may be planned in a truly scientific fashion; and with workers so selected or trained to fulfill the respective job specifications the actual human organization may be created with some degree of scientific accuracy and economy. In fact, the fundamental problem in organization may be said to consist basically in the clear definition of individual jobs and securing of properly qualified persons to fill them. According to Mr. J. E. Otterson: "Organization is the division of work to be done into defined tasks and the assignment of these tasks to individuals qualified by training and natural characteristics for their efficient accomplishment."[21]

ORGANIZATION SYNTHESIS

The next stage in organization synthesis, after all jobs have been scientifically determined and established as standards, is to unite these jobs into logical groups, and these groups into still larger groups, constituting, perhaps, the processes, functions, or departments of the organization. It is this phase of the problem of organization with which studies of organization structure are usually concerned, and to which the term more properly refers. A study of organization structure, however, should always be preceded by scientific job study, for the individual jobs and functions are the building stones with which the structure is erected. By knowing what each individual job consists of, it is possible to fit that job in with other jobs, to group it into its logical department, and to establish the proper control of its various activities. Just as job building follows after an analysis of work into its elements, organization building follows after an analysis of the entire work of the enterprise into its various elemental activities, processes, or services, each composed of a number of individual jobs. As Diemer describes the procedure:

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[20] Ordway Tead and Henry C. Metcalf, *op. cit.*, p. 235.

[21] J. E. Otterson, "Executive and Administration Organization," in Daniel Bloomfield (ed.), *The Modern Executive* (1924), p. 43. By permission of The H. W. Wilson Company, publishers.

> The process of building up an organization that shall be the best for a certain factory depends primarily upon scientific research work, having for its object the dissection of the entire series of internal workings into the elementary steps. We must list these in detail. Following this analytic process comes the even more difficult synthetic one of preparing a structure which shall be the most efficient possible engine of industrial production of its type. We must determine which of these prime elements are to stand alone, and which are to be combined, so that the general result will make a well-arranged, well-built, smooth-running machine. . . .
>
> Such determination requires an inspection of the establishment with a view to determining what type of control is applicable to its various branches.[22]

Bases for the Grouping of Activities

The essential elements of the structure of an organization consist of the individual jobs and the relationships of the various jobs to one another. The chief relationships of one job to another in the structure of any organization are those based upon the nature of the work to be done and its technical organization. For each job, however, there is not one particular work relationship, but many, for every job must be coordinated with the whole work process and with the jobs of all types on every side. There are horizontal relationships with other workers of the same class or grade, vertical relationships with bosses and control officers, and diagonal relationships, perhaps, with specialists and functional officers above and with messengers, helpers, and general service laborers below. The problem in planning the structure of an organization is to identify and to evaluate these various relationships, that is, to determine which are of major and which of minor importance, which are so close or so vital that the jobs concerned should be grouped together, and which so distant or so unimportant that the jobs may be placed in different departments. The primary relationships having been once recognized, it is then possible to develop a structure in which these essential relationships are accommodated automatically and with least friction or control effort.

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[22] Hugo Diemer, *Factory Organization and Administration* (3d ed.; New York: McGraw-Hill Book Company, 1921), pp. 24-25.

The matter of the primacy of work relationships may be clarified and better understood by an analysis of the various different bases for these relationships. It is often heard that workers should be combined into logical groups, or that organizations should be divided into their logical functions or departments, as though there were always only one logical basis for an organization plan. The fact is that there are several distinct bases for grouping or division, each just as good as another so far as logic alone is concerned. A brief review of these bases may be undertaken, therefore, in order to suggest the various logical possibilities for organization structure.

1. No doubt the oldest and most common basis for the grouping of workers, or what amounts ultimately to the same thing, the departmentalization of an enterprise, is that of space, layout, location, or geography. Many kinds of work require that workers be in close proximity to one another—at the same desk or machine, or in the same office, building, city, or district. Even when the nature of the work process itself does not demand definite localization, yet for

the purposes of supervision, control, or mutual assistance space may prove the most suitable basis. In fact, the work process itself is frequently so arranged or rearranged that all work of a particular kind is routed to a particular place at the expense of large transportation or communication costs. Plant layout must, of course, be designed according to some basis, such as process, machine, etc., for its purpose is to facilitate the work process in its entirety, including the personnel organization. The plant, once erected, however, may then become itself a basis for grouping activities or workers. For example, certain floors or certain buildings are sometimes placed under one supervision or designated as a department regardless of the different types of work there contained, just as the structure of a sales or public utility organization is often determined by the geography of a country or region. It is only with the development and cheapening of transportation, communication, and other agencies for the annihilation of space that this basis has been reduced to other than of primary importance, and even yet it must often be used along with all bases, and especially so wherever an organization must scatter its activities over a large territory.

2. The large overhead costs of highly capitalized industries together with the shortening of the work day and week of labor make the multiple-shift day and week inevitable. It is necessary, therefore, to recognize time or shift as a basis, since the grouping of workers into shifts and reliefs naturally complicates the task of coordination, supervision, and control. Consequently, this basis must be considered wherever more than one shift is employed, and, perhaps, superimposed upon whatever other basis or bases there may be.

3. The nature of the product often determines the lines of division in an organization. As examples: the General Motors Corporation sets up a separate division or company for each of its main lines of product; the old guilds and the present trade unions have followed in many cases the product basis of specialization; department stores and other mercantile establishments divide or specialize according to product; and, finally, for cost accounting purposes in all

industries this basis is essential. Wherever one concern manufactures or sells a varied line of products some attention must usually be given to this basis; and wherever the product is highly technical or complex, demanding specialized equipment or skill in its assembly, adjustment, or sale, product is usually found to serve as the most fundamental basis.

4. The nature of the material worked upon may also serve as a basis for departmentalization. For example, a carpenter is defined as one who works on wood, and by union agreement carpenters have been prevented from hanging metal doors and sash. Frequently, however, the nature of the material is coextensive with the product, making these two bases for organization purposes identical, as for example in the case of all mercantile establishments. The materials basis should prove useful wherever widely varied materials of a highly technical nature are used.

5. The basis of grouping determined by the tools, machines, or equipment worked with has become, perhaps, the most prevalent basis of job specialization and departmentalization in modern manufacturing establishments. According to this basis all machines of the same kind, together with their respective tenders, operators, and mechanics, are grouped together and controlled as a unit. The skill and knowledge of the workers—supervisors and engineers included—is adapted to and commensurate with that required to operate, maintain, and control the group of machines. Although it is not essential to this basis for organization purposes that all machines of a certain kind be located at one place, yet such is a common practice and often desirable. Accordingly, the machine serves as a basis not only for grouping the personnel but also for first laying out the plant and arranging the equipment. As such it is described and distinguished from the process basis by Mr. Stoll of the Western Electric Company as follows:

> In the arrangement of plant equipment there are two common methods open to the manufacturer. The first, and probably the most extensively followed, is the segregation of machinery and equipment according to class of work. Under this scheme one group or department per-

> forms drilling work only; another, punch press operations, another, milling, and so on. During the process of manufacture each part passes in proper sequence through these various groups, until it reaches a department engaged entirely in assembling the product of which the part is a component.
>
> The second method is that of assigning to each group the equipment required for the complete manufacture of an assembled unit. . . .
>
> Which of these two arrangements is the more economical depends upon the type and variety of the products to be made and the size of the schedules.[23]

6. The number of departments in a factory, according to Sparling, "will depend upon the number of processes into which the manufacture of a given product can be naturally and economically divided."[24] A process, as defined above, is a stage or division in the complete work process or system; it includes a series of several successive operations performed usually upon a group of heterogeneous materials or products, each operation requiring, perhaps, a different machine or type of skill. The basis of combining the various operations into processes is that of sequence in the system of work. The same process may be performed upon what will ultimately become different products. Moreover, the entire process does not need to be performed in one place. With the growing use of straight-line layouts and conveyor belt assemblies this basis tends to become the predominant one for organization division as well as for the grouping of machines. Even when another basis is followed in establishing the main operating divisions, the technical staff is frequently specialized according to processes.

7. Another most useful basis of classification and division is what may be here designated as skill, or all those characteristics of the worker affecting the performance of his job. It may include, therefore, such attributes as the worker's particular psychological make-up, the kind and quantity of his knowledge and training, his occupation and experience,

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[23] C. G. Stoll, in Hugo Diemer, *How to Set up Production Control for Greater Profits* (New York: McGraw-Hill Book Company, Inc., 1930), p. 73.

[24] From Samuel E. Sparling, *Introduction to Business Organization* (1919), p. 111. By permission of The Macmillan Company, publishers.

and even his race or nationality. It is not meant, of course, that these various attributes are correlative or that they lead to the same grouping. For instance, a salesman should have certain emotional and personality traits, it is believed, in addition to a knowledge of his particular product; a teacher of engineering subjects should possess the knowledge of an engineer but the aptitudes and the art of a teacher; moreover, the possession of knowledge and the ability to apply that knowledge effectively do not necessarily go together. Each of the various characteristics may alone serve as a separate basis for division. For example, laborers are often grouped into gangs according to their race or nationality, construction companies are frequently compelled to follow customary trade lines in the division of their work, and university faculties are usually divided according to the respective fields of knowledge. For practical purposes in industry, however, skill may be taken as representing the manifestation of the sum-total of all those attributes inseparable from the person of the worker which affect his particular fitness for his job.

The basis for the classification of skill itself is, as seen above, often the material, the machine, the process, or some other factor, making the basis of skill identical with these other bases so far as the resulting organization structure is concerned. Although a grouping may be made apparently on the basis of machine or some other factor it is often the skill required by that factor that is most essential. Machines may be grouped together not so much for the purpose of having like machines or like operations together as for the purpose of bringing like skills together under one supervision and control. However, the two purposes may not always be clearly distinguishable. Functional foremanship, as will be seen below, represents an attempt to establish skill as a main basis, or to superimpose it upon other bases for the purposes of instruction and supervision. In any case, skill constitutes a basis that cannot be ignored, and, with the growing application of scientific knowledge and technical training to industry, it purports to become of even greater significance. This basis is also known as the functional basis. It is further defined and distinguished below.

8. The basis of function, or, more properly, organ, or factor, as noted in the preceding chapter, is perhaps more involved in argument than any other basis. This argument seems to be due primarily to a lack of agreement as to the meaning of the word "function" or as to what constitutes a function in an administrative organization. The usual definition of function is not sufficiently complete to distinguish this basis from any other. For example: "By 'function' is meant a group of logically related and interdependent activities."[25] Or, "A *function* is a nucleus of activities, responsibilities, or duties so homogeneous in character as to fall logically into a unit for purposes of execution."[26] In neither definition is the logic of the relationships or of the homogeneity indicated. Even Sheldon's definition and explanation leaves room for confusion. He says:

> A function, however, is dependent upon an object. In order that some object shall be achieved, certain work must be done which is divisible into functions. Clearly, the object determines what work is necessary, and which portions of that work are primary and which are subsidiary.
>
> The discharge of functions, further, requires the exercise of human faculties, and functions are limited by the capacity of human beings, either individually or collectively, to discharge them. Production is the sum of various functions, and to come within human compass must be divided into its constituent functions. Scientific organizing requires, therefore, that the functions to be discharged, so that their cumulative effect may be production, must so divide that normal human faculties can successfully discharge them.[27]

Thus, a function is apparently both a group of activities having a common objective and also a group of activities requiring similar human faculties. In many cases, no doubt, a group of activities could qualify as a function according to both bases simultaneously. However, this is not always true, especially when a high degree of division of labor is applied in accomplishing an extensive and complex objective.

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[25] Thomas R. Jones, *Theories and Types of Organization* (Production Executives' Series; No. 83; New York: American Management Association, 1929), p. 10.

[26] Ordway Tead and Henry C. Metcalf, *op. cit.*, p. 350.

[27] Oliver Sheldon, *The Philosophy of Management* (London: Sir Isaac Pitman and Sons, Ltd., 1923), p. 105.

As may be observed from the various classifications of functions previously given,[28] a division of activities according to objectives often resembles, in results produced, a division according to productive factors. The meaning of "function," based upon objectives, is in consonance with its use in denoting a part of the complete process or system of work, as discussed in the preceding chapter. In order to distinguish a function used in this sense from a function as may be otherwise defined, the term "organic function" may be adopted.

Another meaning of function makes of a function a group of activities requiring similar human faculties. A classification of functions upon this basis is the equivalent of a classification according to the basis of skill as previously defined. This may be observed from several quotations. According to Dr. Person: "By 'functions,' as the word is used in management literature, is meant the logically separable elements of an integral whole of activity which have each a distinguishing characteristic, such as the effect of the activity on the nature of the skill required; for instance, the function of design and the function of execution."[29] This same idea is found in the term "functionalization." According to Mr. Dennison: "To departmentalize chiefly with respect to similarity of the necessary mental characteristics is what is most commonly meant by functionalizing."[30] It is also manifest in "functional organization," for example: "In such organizations the structural relations of the departments or offices are based on knowledge of the fields covered and of the proposed functions; and, conversely, the functions or services of the several departments depend on a proper partition of the knowledge developed in the study, service, or business."[31] A function is, therefore, a group of activities requiring similar skill in their performance, and this is its meaning in the terms "functional foremanship" and in "the functional type."

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[28] *Vide supra,* Chap. III, *s.v.* Functions.

[29] Harlow S. Person, "The New Attitude toward Management," in The Taylor Society, *Scientific Management in American Industry* (New York: Harper and Brothers, 1929), pp. 28-29.

[30] Henry S. Dennison, *op. cit.,* p. 144.

These eight bases constitute, therefore, the different ways in which workers and their activities may be grouped, or, what amounts fundamentally to the same thing, the ways in which the activities of the personnel may be divided.

It should not be understood, in this connection, however, that for each organization only one basis must be selected and the departmental structure developed throughout according to that basis, and to the exclusion of all others. The fact is, that two or even more bases may be employed simultaneously, each depending upon the purpose it is to serve. It is common practice in organizing an enterprise to group the individual workers first according to some basis such as machine or skill, then to combine these groups into still larger units according to some other basis, probably process or location, and then to combine these units according to the basis of organic function or product, and so on. Moreover, each individual job, or worker, may also be classified and grouped according to two or more bases at the same time, each classification being, of course, for a different purpose. This is the general plan and essential feature of functional foremanship, in which a worker is subject to as many supervisors as the nature of his work or his skill may permit of division and classification. Multiple-basis groupings quite naturally make the task of developing a definite organization structure more complex. As Professor Black well recognizes: "One of the most serious difficulties encountered in organization of enterprises for operation is that of classification upon two or more bases at the same time."[32] Whether or not more than one basis is utilized in planning the structure of an organization, it should be realized that an analysis of the activities of an organization according to these different bases may reveal even new relationships and entirely different possibilities for personnel control.

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[31] Henry E. Bliss, *The Organization of Knowledge and the System of the Sciences* (New York: Henry Holt and Company, 1929), pp. 56-57.

[32] John D. Black, *Introduction to Production Economics* (New York: Henry Holt and Company, 1926), p. 534.

This problem of the selection of the essential bases which are to serve in developing the control mechanism and to typify its basic structure will be deferred, however, to the following two chapters. Having analyzed the bases for grouping activities, consideration may be given next to an explanation of organization charts which portray in outline form the organization structure.

ORGANIZATION CHARTS

The best instrument for depicting the structure of an organization is the organization chart. As Lansburgh says:

> Organizations have their photographs taken through the preparation of organization charts. These set down on paper the structure of the organization, by indicating positions or departments, and then showing the lines of supervision between them, as well as frequently definitely stating under each position or department the responsibilities attaching thereto.[33]

And as Mr. Henry Ford quite sarcastically describes them, in speaking of the "genius for organization": "This usually results in the birth of a great big chart showing, after the fashion of a family tree, how authority ramifies. The tree is heavy with nice round berries, each of which bears the name of a man or of an office. Every man has a title and certain duties which are strictly limited by the circumference of his berry."[34]

Sheldon, however, offers a somewhat fuller description, in which he states the general purposes of the organization chart and distinguishes it from the procedure chart.

> The Organization Chart should show (*a*) How work is divided between the various areas of individual responsibility; that is, the distribution of functions. (*b*) How the individual faculties are distributed between the various divisions of the work to be done; that is, the distribu-

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[33] R. H. Lansburgh, *Industrial Management* (2nd ed.; New York: John Wiley and Sons, Inc., 1928), p. 58.

[34] From *My Life and Work* by Henry Ford, in Collaboration with Samuel Crowther, copyright 1922 by Doubleday, Doran & Co., Inc., p. 91.

> tion of faculties. (*c*) How authority and responsibility are delegated, since each sub-division of functions represents a delegation of authority and responsibility. The Chart of Procedure, on the other hand, should show the procedure by which work is accomplished. It should show at what particular points in the procedure individuals contribute their specific duties. Thus, while the Organization Chart shows the relationships between individuals as a result of delegation, the Chart of Procedure shows their relationships as a result of their participation in carrying out a function or piece of work. The Organization Chart, therefore, works, as it were, perpendicularly, and the Chart of Procedure horizontally.[35]

The usual description of an organization chart, as just seen, commences quite logically at the top with the position of the chief executive, and shows how the total work of the enterprise is divided among the major departments and their respective executive officers. In like manner the work of each department is shown distributed among the various subdepartments and their officers. Subdepartments are then divided into smaller units, and so on until the individual laborer is finally reached. A more accurate description, however, would commence at the bottom with the jobs of the individual laborers and show how these jobs are united first into primary groups and these into the larger groups or departments, and so on. It should show what work each group is to perform in terms of activities and responsibilities and how each group is supervised and instructed by the various officers and technicians. The organization chart is dependent upon the procedure chart and the organization of work for its basic structure; but, a definite procedure having first been developed, it attempts to portray the various relationships arising from the necessity of advising, instructing, and supervising the various workers in the performance of their duties.

The organization chart consists of jobs and job relationships graphically represented. The jobs are usually represented by squares, blocks, spheres, or "berries," and relationships by lines connecting the various jobs. Jobs may be arranged horizontally on the chart according to the chief basis of classification or grouping determined by the nature of the work and its organization and layout, with jobs and groups closely associated in the work process shown if possible in close proximity on the organization chart. The vertical arrangement may then be according to the grade or position in the official hierarchy, which should of course correspond to some extent with the salary scale. Heavy lines are ordinarily used to connect any position with another position supervisory to it and completely responsible for the correct performance of its activities. Light lines are used in connecting jobs with others to represent functional supervision and instruction, i.e., a relationship in which only a part of the activities of one position are within the sphere of responsibilities of another. Broken lines are commonly used to show whence advice and service may be obtained, or where the jobs are related through mutual assistance and cooperation. Thus, every job may be connected with a number of other jobs by lines of different kinds representing the various existing relationships established by the particular type of organization and management employed. Technicians, foremen, and other junior officers may be connected by several lines from both above and below, and the major executive positions may have lines of all types radiating downward.

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[35] Oliver Sheldon, *op. cit.*, pp. 116-117.

Lines do not ordinarily connect jobs with jobs coordinate or parallel in the work process or system, for the relationships between these jobs are shown on the procedure chart and described in the routines and the procedure instructions. The organization chart is based upon the procedure chart for its fundamental structure, but it is in no way a duplicate of such a chart. The organization chart shows how the work relationships result in other relationships having to do with authority and responsibility, instruction, and advice; it shows, therefore, only the derived work relationships. Even these relationships cannot be fully portrayed on the chart, but for any organization it is possible to show the most essential of these relationships, the less important ones remaining to be described in the accompanying explanations and instructions.

Accompanying every organization chart, there should be an organization record or manual which describes in detail the activities, the responsibilities, and the executive authority of every position shown on the chart. Such a manual then supplements the routines and procedure instructions, which describe, usually in sequence, the various steps in the systems and processes. The purpose of the manual is to explain how the steps and the processes are divided among the various jobs in terms of particular job duties. Personnel charts are also prepared from time to time showing the name, the location, and perhaps other information concerning every individual job holder. It takes these accompanying records to round out and illustrate completely the organization chart. According to Deimer: "More and more it has been appreciated that some graphic method of showing inter-departmental relations is necessary if responsibility is to be placed."[36]

The use and the relationship of these various records are further explained, as follows:

> Specific duties must be clearly set forth not only for each group of individuals and various departments, but a schedule of individual responsibilities and routine should be prepared for the use of each individual in each department.[37]
>
> In addition to charting the organization, it is customary to write up a detailed description of the responsibilities and duties. This is designated as the "organization record." This is supplemented by further written descriptions of the operation of systems. These descriptions are usually designated as procedures and are given consecutive numbers so that they can be indexed and revised and easily identified.[38]

And according to Robinson:

> To sum up, the organization manual explains in detailed form the grouping of functions and lines of authority which the functional organization chart can present only in outline, and fixes definitely the limits of individual control which are graphically shown only when the personnel chart is superimposed upon the functional organization chart. Through the manual, the charts are made

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[36] Hugo Diemer, *op. cit.*, p. 40.

[37] *Ibid.*, p. 30.

[38] *Ibid.*

> more intelligible to the worker, who can with its assistance clearly distinguish his own position and duties and their relation to those of every other member of the organization.[39]

Organization charts and their accompanying manuals, if scientifically constructed, may be made to serve many purposes. These have been well described by Mr. White, as follows:

> The ideal organization chart serves the following purposes:
>
> (1) Assignment of responsibility. There is no function of the business so remote that it has no connection with some other part of the concern. The organization chart definitely establishes this connection. Furthermore, by plotting the position occupied by each individual in the business, responsibility for errors can be correctly placed, and without delay.
>
> (2) Job analysis. The grading and assigning of duties presupposes an organization chart. When a unit of work is divided into its component parts, these can be shown on a chart as a record and a standard. After that, the personnel department must see that the divisions shown by the chart are correctly interpreted.
>
> (3) Line of promotion. The organization chart not only marks out definitely the place of each individual in the organization, but also shows his path of promotion.
>
> (4) Coördination of functions. In every business there is more or less friction because of overlapping functions, disputed points of authority, etc. The organization chart helps to settle such questions. If a change is made in procedure, it should be immediately noted on the chart.
>
> (5) Accounting. In many plants, problems of accounting are made difficult because of the inability to allocate expenses according to any definite plan. The organization chart makes each department or individual responsible for certain costs.[40]

The first four of these purposes are well recognized and need no further comment here; the last-mentioned purpose, however, may not be always accepted, for accounting classifications often cut across organizational lines. Even though a different basis for the classification and organization of accounts may be required for certain financial purposes, these same accounts can often be easily rearranged and grouped to fit the structure of the control organization. This is a recognition that whoever controls the purse strings in an organization or department ultimately controls that unit and should be accountable for its results. It merely attempts to make financial authority coextensive with executive authority. Mr. John H. Williams has repeatedly advocated such a purpose of organization charts, and he explains as follows:

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[39] Webster Robinson, *Fundamentals of Business Organization* (New York: McGraw-Hill Book Company, Inc., 1925), pp. 74-75.

[40] Percival White, *Business Management: An Introduction to Business* (New York: Henry Holt and Company, 1926), p. 85.

> If the organization chart represents the units of responsibilities and duties upon which the success or failure of the enterprise depends, then obviously it represents the units in which all costs and records should be kept if the chief executive is to exercise an effective control over the situation . . . every expenditure should go at once to that organization unit of which the head is responsible for the expenditure, and should stop there.[41]
>
> The *individuals* to whom responsibilities and duties are allocated are the principal sources of success or failure. Unless records are kept in terms of these sources, the chief executive has no effective means of judging the results in terms of responsibility. . . . The chief executive of the past studied the cost and effectiveness of departments as such. Today he studies the cost and effectiveness of the individuals charged with the duties and responsibilities which constitute the department.[42]
>
> An accounting classification made by any one other than the person who determines duties and responsibilities, or made in advance of the determination of duties and responsibilities, is *prima facie* an ineffective accounting classification.[43]

Thus, an organization chart so constructed becomes a true outline of administrative procedure of the organization.

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[41] John H. Williams, "A Technique for the Chief Executive," in Edward E. Hunt (ed.), *Scientific Management Since Taylor* (New York: McGraw-Hill Book Company, Inc., 1924), p. 87.

[42] *Ibid.*, p. 89.

[43] *Ibid.*, p. 90.

It depicts the basic structure of the management mechanism in its entirety, including not only the system for the control of the personnel through the delegation of authority and responsibility, but, also, the organization for the control of production and of equipment, and the organization of the budget. It attempts a recognition of the fact that authority and responsibility cannot be arbitrarily delegated, but that responsibilities arise out of the particular system and the work process. For instance, it is misleading for an organization chart to represent a certain person as having full authority over a certain department when the personnel is specialized and grouped according to the machine and the machines are controlled by an executive engineer. The so-called department manager is in that case merely a personnel manager under the supervision of the engineer. Or, again, if a department manager is deprived of the control of his departmental budget it is useless to hold him responsible for the financial efficiency of his unit. The scientifically constructed organization chart must be the result of an analysis of the entire productive mechanism with all its inner relationships and interdependent functions.

Thus, in conclusion, it is seen that the process of developing the structure of an organization begins with an analysis of the work of the enterprise. It resolves this work into elementary units of activity and proceeds by uniting such units to comprise the various jobs, functions, departments, etc. It takes into consideration the work to be done, the conditions surrounding and affecting its performance, and the nature of the members of the personnel and their adaptability to productive requirements. The process is particularly concerned with the grouping of workers for the purpose of supervision, instruction, and assistance in performing the desired work. There are noted in the grouping of activities and workers many logical bases for establishing relationships and control groups. Finally, it is noted that charts and manuals are used to illustrate graphically and to explain the various work and control relationships. An understanding of this process is essential to the understanding of the types of control that may be employed and their particular applications.

CHAPTER V

TYPES OF ORGANIZATION

As has been previously indicated, the proper approach to the study of organization structure is not by the way of a classification of organizations according to types, although this is the approach almost invariably employed. It consists of a classification of organizations according to line, line-staff, functional, and possibly other types, and an attempt to compare organization structures with one of these types.

The proper approach to the study of organization structure, on the contrary, is through an analysis of the work to be done and its organization, discovering therein the relationships inherent in the work process. The problem of developing the structure of an organization is then to adopt the type of control most suitable to each individual job or group of jobs; not to select some one type of control, and then force all the various control relationships to fit the specifications of the selected type. The proper service of organization types is to furnish certain more or less definite abstract norms or formulae for defining and explaining the various control relationships as they exist. An organization type describes, as the word denotes, a typical relationship, one that may never be found to exist in its pristine form throughout an entire organization. An examination of existing organizations should usually reveal examples of possibly all types along with many variations and combinations. A definition of types will, therefore, provide the student of organization structure with standard concepts for the better understanding and the better construction of the plan of an actual organization based upon an analysis of the work process.

It should be pointed out here that the study of organization types is not the same thing as the study of the bases of grouping, or of dividing the workers into logical groups in an organization. There is sometimes confusion between these two distinct branches of organization study. In the words of Thomas R. Jones: "In this argument we are confusing two things:—the operating *units into which we may divide* an organization and the general *method by which authority is exercised and delegated.* We may immediately clarify the situation by saying that an organization may be divided according to one principle and controlled in accordance with another."[1] Mr. L. C. Sorrell also observes that: "It appears that business departmentation is the more fundamental problem, than the distinction between types of executive authority; the latter if it is done, is usually superimposed upon the former."[2]

The problem of departmentation, or the grouping of workers into logical working units, has been treated in the previous chapter, in which it was attempted to show that the basis for the groupings was determined by the nature of the work process and the surrounding conditions. The problem of the type of control for workers and for the work groups is the burden of the present chapter. The plan of procedure, therefore, will be first to define and to distinguish the various types of control relationships, and in a subsequent chapter to point out the advantages and disadvantages inherent in each main type and to survey the conditions under which each type might be expected to serve best.

THE LINE TYPE

Possibly the most primitive type of control organization is that known as the line, military, or departmental type, which Rubey describes as follows:

> Individual, military, or line control is the oldest and simplest form of organization. Here the executive or sub-executive is in direct and exclusive charge of his subordinates. All instructions and orders as to both standards and performance are issued through him, and his men look to him as the sole source of authority. The executive is frequently advised by specialists, but the direct orders pass through his hands. Each sub-executive in turn reports

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[1] Thomas R. Jones, *Theories and Types of Organization* (New York: American Management Association, Production Executives' Series: No. 83, 1929), p. 9.

[2] *Ibid.*, p. 46.

> to one higher executive and receives all orders and instructions from that single higher executive.[3]

Sheldon further describes this type of organization as follows:

> Each department is a complete and self supporting entity, irrespective of other departments. Authority is definite and absolute. The manager of the department has complete command, under the general manager, over all the factors concerned in the operation of his department. He delegates the work of the department, not by function, but by definite sections of the process of manufacture. Each section is under a foreman, who is responsible, absolutely and wholly, for the work of his section, except for those particular items which the manager does not delegate, just as the manager himself is responsible for the work of all his sections. The work being thus divided, there exists practically no inter-relationship between departments or between sections, except such co-ordination as is provided by the general manager, for departments, and by the departmental manager, for sections. The faculties provided by the personnel of each department are mainly executive, with other faculties inextricably included in the executive faculties. The main general duty of the manager is to carry out the work of his department, with what staff he requires, as seems to him best, subject to the veto of the general manager.[4]

It must be noted, in further distinguishing the line type, that there are really two distinct forms of this type of organization. The first may be designated as the pure line type, and the second, the departmental type. The pure line type is what Atkins has in mind when he writes: "In the line type, the activities on any one level are all the same; that is, every workman has just the same kind of job to do, and so on, up to the higher grades. . . . Each group of activities is an integer itself, supposedly sufficient for the tasks which it is expected to perform."[5]

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[3] Harry Rubey, *Industrial Organization* (Boston: Ginn and Company, 1931), p. 55.

[4] Oliver Sheldon, *The Philosophy of Management* (London: Sir Isaac Pitman and Sons, Ltd., 1923), p. 119.

[5] Paul M. Atkins, *Factory Management* (New York: Prentice-Hall, Inc., 1926), p. 36.

Thus, the line type in its purest form is represented by a mere division of the personnel into similar or identical groups with little or no specialization among the different control groups. All workers and executives are arranged according to a definite hierarchy of rank, the duties and the authority of all members of each rank being for purposes of control exactly the same. The purpose of such a plan is merely to reduce a group of large size to manageable units by simple mathematical division and subdivision. The plan carries out the principle of the interchangeability of parts in its most complete form in organization structure. The basis of division, or of grouping the personnel, under this form must ordinarily be that of space, time, product, or some basis in which the activities or functions performed are, of course, practically identical, a condition which can seldom be found in modern industry, based as it is most fundamentally upon the principle of division of labor. This form of organization does have its application, however, sometimes in the lower ranks or smaller units where large numbers are employed doing simple routine labor, and again in the sales departments of concerns doing business over an extensive territory. Owing to the lack of specialization possible in this form its most common use is in connection with a specialized staff, the two being combined in an organization to form the line-staff type discussed below.

The departmental form of line organization is most widely used in modern industry. It differs from the pure line only in that each of the divisions or groups in the organization performs essentially different activities or functions. Here the work of the enterprise is cut up into separate and distinct units or segments, each unit or segment becoming a separate operating department, or "water-tight compartment." If the plan is carried out from top to bottom, each such unit or department is in turn divided into subdepartments with a definite subsegment of work to perform, and so on to the smallest groups in the organization. This form retains always the principle of direct line control; each department or subdepartment is under the absolute command of its respective executive officer, who only is held responsible for the performance of the work assigned to his unit. The coordination of the work of any two of the various units is the responsibility of the lowest-rank executive officer having both those units under his command. This form may also be assisted by staff specialists, who may in addition to other activities serve as liaison officers between the various departments.

This form of organization is often confused with the functional type because of the fact that the basis for dividing up the work of the enterprise is frequently that previously described as the organic or functional basis. This basis, however, is not the only basis that may be used; the bases of process, machine, product, or material may serve equally well in establishing the various departments, provided, of course, that the activities homogeneous as to the nature of the skill required are grouped together to constitute the functions. This confusion will be dealt with again below in discussing the functional type.[6]

THE LINE-STAFF TYPE

The second type of organization is that usually called the line-and-staff or line-staff type. In the words of Oliver Sheldon:

> The distinguishing feature of this form of organization is the organization of the staff. The staff organization may be described as a deliberate organization for thought, just as the line organization is the organization for execution. The presumption is that the executive manager . . . cannot have time or opportunity for the investigation, analysis, co-ordination of information, and constructive thinking which are necessary for progress. . . . The essential feature of the staff organization is that it is purely consultative and advisory, and exercises no direct authority over the line. . . . The staff organization is wholly supplementary in character. It is the organization of expert knowledge, for the guidance of executive officers. . . .[7]

Mooney and Reiley further distinguish the type as follows:

> The staff function in organization means the service of

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[6] See pp. 133-137, below.

[7] Oliver Sheldon, *op. cit.*, p. 120.

> *advice* or *counsel*, as distinguished from the function of authority or command. This service has three phases, which appear in clearly integrated relationship. These phases are the *informative*, the *advisory*, and the *supervisory*.
>
> The informative phase refers to those things authority should know in framing its decisions, the advisory to the actual counsel based on such information, and the supervisory to both of the preceding phases as applied to all details of execution. It is through this last phase that the informative and advisory features become operative throughout an entire organization.[8]

These authors further clarify a point that might be misinterpreted from reading the passage quoted from Sheldon:

> Above all it is essential to keep in mind that the difference between staff and line is not the difference between thinking and doing, for these two faculties are inseparable in every psychic movement, and are therefore present in every activity. The term staff is strictly one of formal organization, intended to distinguish the mere function of counsel from the scalar right of command.[9]

They also state the proper purposes of the staff, as follows:

> It is evident from what we have said that there are two prime necessities in an efficient staff service, which may be termed *coordination* and *infiltration*.
>
> The term *coordination* describes the necessary method of sound staff procedure, but *infiltration* of knowledge is the ultimate aim and purpose of all staff activities. Staff service is not alone for the top leader, or supreme executive. . . .[10]

As it was possible to identify two different varieties of the line type of organization, i.e., the pure line and the departmental, it is likewise possible to identify and distinguish several varieties of the line-staff type. The first and simplest of these varieties or forms may be represented by an executive of a line organization assisted by one aide or counselor outside the hierarchic chain of command. This aide may be, for example, a private secretary, who has no rank or authority in the line structure but who reports directly to the chief executive. Or the staff may consist of one counselor or expert no longer consulted as an outside professional or specialist but employed to render his entire services to the chief executive. Thus, the distinguishing feature consists in introducing this individual into the membership of the organization as a fellow worker.

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[8] James D. Mooney and Alan C. Reiley, *Onward Industry!* (New York: Harper and Brothers, 1931), p. 60.

[9] *Ibid.*, p. 63.

[10] *Ibid.*, pp. 72, 73.

The next variety in the order of complexity is found when two or more counselors and/or aides are brought in as staff members of the organization. Each one of these persons reports directly to the chief line executive to give assistance or advice in his respective field, each having no authority over others and being responsible for no counsel or cooperation with another. Each staff member works here alone or individually, having contacts only with or through the chief executive.

A third variety is introduced when the various staff individuals are brought together under a chief of staff. Here the staff members work under a chief who has some executive authority over them, who may coordinate their various activities, and who may relieve the chief executive officer of assimilating and integrating the various kinds of information and service of the specialists and assistants. There may be, of course, many variations in the degree of unity of the staff. In some cases it will be a rather loosely knit body joined together only by more or less routine formalities, by proximity, by frequent conferences, or by occasional committee meetings. In other cases the staff may be organized as a separate and complete department distinguished from other departments only by the nature of the work it performs. Any of these forms of staff organization may also be employed to serve only one division or department, in the same manner as described for the organization as a whole, forming thereby a departmental staff.

The three conditions here outlined hardly justify, however, the title of line-staff, since any officer in an organization of any type may be supposed to employ assistants to aid him in the performance of certain functions. There are probably few higher officers, whether line, staff, or functional who are not assisted by secretaries, professional consultants, or others whose relationship is immediate, and possibly to some extent personal or confidential. Furthermore, it is the duty of any worker or officer to give information and advice to his superior who is responsible for the inferior's activities. At law an agent may not withhold information from his superior, and it is indeed a poor leader or officer who never seeks the opinions and the advice of his subordinates.

Another fundamentally different idea, and in fact the essential idea, of the service of the staff in the line-staff type of organization is that the staff members should assist or advise not only the chief executive but other members of the organization as well. Contacts are then made directly between the staff specialist or specialists, as the case may be, and any member of the line hierarchy who may seek assistance or advice. The control relationship of staff specialist and line executive is still that of counsel or professional service, regardless of the ranks of the two officers. As is often the case, staff advice is tantamount to executive order, for it is the staff information and advice that serves as the basis for executive orders; however, the authority of a line executive must always intervene either by original formulation or by mere approval before the instructions of the staff become compelling orders for the execution of line officials and workers. Under this form of staff control all members of the staff remain separate and detached from any line unit. They may be, as indicated above, organized into a loosely knit group or committee under a chief of staff, into a separate department, into several departments, or into any combination of these.

Perhaps the most complex form of line-staff control is that sometimes described as the unit or divisional type of organization.[11] This type consists of a line-staff type of control, the line being divided according to one basis, usually that of territory, product, machine, or process, while the staff is divided according to a different basis, frequently that of function, skill, or knowledge. Each territorial or such line unit is placed under the command of an officer who has complete authority, but who is assisted and advised by a staff composed of representatives of each of the specialized divisions of the staff at headquarters. Each line officer's unit, usually called a division instead of a department, is a duplicate in miniature of the headquarters organization. The divisional staff officers receive assistance and advice from their respective specialized staff officers at headquarters, but they are responsible directly to the divisional commander. Each division may in turn be divided into sections, each section being the responsibility of a line executive who is in like manner assisted by a staff composed of representatives of each or certain of the main functional or other such officers of the divisional staff. The staff officers in all divisions or sections must keep in close touch with the staff officers in the same field or function at headquarters through correspondence, telephone, and occasional visits, but at the same time they report directly to their immediate line executive.

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[11] See Fredrick L. Lamson, "General Administrative Organization and Control," in G. T. Schwenning, *Management Problems* (Chapel Hill: University of North Carolina Press, 1930), pp. 247 f.

The organization of the staff and the various relationships of its members under this type is well described by Mooney and Reiley as follows:

> For complete and up-to-date information of this character the local staff function is dependent at all times on the staff services higher up. It is this necessity that imposes in organization a scalar chain of advisory staff contacts quite distinct from the central scalar chain of line authority, yet always dependently related to these line duties. Without this scalar chain of staff contacts, complete horizontal coordination of staff services, of a truly efficient kind, would be possible only at the top. There would be no machinery for the infiltration of the same completeness in staff knowledge and the same efficiency of staff counsel throughout the entire organization.
>
> It is evident from these considerations that the departmental staff official at the home office of an industrial organization exercises a dual function. His first function is to inform or advise his line chief, either directly or through the form of coordinated staff service provided by

> a good committee system. His second is to inform and advise the staff services corresponding to his own in the lower links of the scalar chain.[12]

It is apparent that this plan of organization structure makes it possible to apply a unified staff service throughout the organization down to the smallest subsection, at the same time maintaining definite line units for immediate control. It permits of the division of an organization upon two or more bases at the same time without involving multiple control. It is this form of organization which, as will be seen, most closely resembles the functional type described below.

THE FUNCTIONAL TYPE

The functional type of organization was first distinguished from the line or departmental type by F. W. Taylor, who said:

> Under the ordinary or military type the workmen are divided into groups. The men in each group receive their orders from one man only, the foreman or gang boss of that group. This man is the single agent through which the various functions of the management are brought into contact with the men. Certainly the most marked outward characteristic of functional management lies in the fact that each workman, instead of coming in direct contact with the management at one point only, namely, through his gang boss, receives his daily orders and help directly from eight different bosses, each of whom performs his own particular function. Four of these bosses are in the planning room and of these three send their orders to and receive their returns from the men, usually in writing. Four others are in the shop and personally help the men in their work, each boss helping in his own particular line or function only. Some of these bosses come in contact with each man only once or twice a day and then for a few minutes perhaps, while others are with the men all the time, and help each man frequently.[13]

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[12] James D. Mooney and Alan C. Reiley, *op. cit.*, p. 512.

[13] F. W. Taylor, *Shop Management* (New York: Harper and Brothers, 1911), p. 99.

Mr. Henry H. Farquhar has also described this type, and further distinguished it from the other types. This type, he says, embodies:

> . . . the specialization feature of the staff idea, but added the further requirement that instead of the staff expert remaining outside the lines of authority, he was brought into the body of the organization and given authority and responsibility throughout all phases and all operations necessitated by the activities of the particular function. . . . The idea underlying one is expert knowledge offered in an advisory capacity only; the idea of the other is expert knowledge coupled with authority to make that knowledge effective in practice.[14]

The functional type must also be distinguished from an organization the work of which is divided according to the basis of organic functions. This is done by Mr. Farquhar as follows:

> A further misconception, however, should be cleared up. The subdivision of an organization into sales, production and financial departments does not constitute functional organization as developed by Taylor. These are simply logical subdivisions of the general manager's burden, neither new nor radically different from what has been going on along the lines of division of labor for centuries. For the real difference one must go below the upper strata of activities and search throughout the whole group down to and including the workman at the bench. If throughout this group he finds that the natural functions in every case, including the work of the man at the bench, have been definitely determined and entrusted to the responsibility and authority of some one functional official, unlimited in area and supreme in his own functional field (except, of course, as in all cases, channels of appeal in cases of disagreement must be established), then he finds the true functional organization designed and so effectively used by Taylor.[15]

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[14] Henry H. Farquhar, "Functional Organization," in The Taylor Society, *Scientific Management in American Industry* (New York: Harper and Brothers, 1929), p. 141.

[15] *Ibid.*, pp. 141-142.

Mr. Jones, also, differentiates the three types quite clearly:

> Staff and functional organization arise out of the same necessity,—the necessity of specialization. Staff and functional executives may, in exactly similar organizations, have jurisdiction over exactly similar functions, but one may be staff and one may be functional. What differentiates them? The quality which differentiates them is the relationship of the organizational unit to the main operating organization. The staff unit is advisory. The functional unit is executive and is responsible for the operating control of the functions assigned to it. If a functional unit is self contained in that all the mechanism for the performance of its functions lie within the unit, it is a line unit and its status is no different than that of a unit which may be organized according to product or equipment. Functional control connotes multiple control or performance characterized by the functional set-up of the control units.[16]

The variations found in the functional type of organization are due to the degree to which the functional principle is applied through the entire organization structure, from top to bottom. F. W. Taylor started at the bottom, applying the principle of functional control to the workman and the lowest ranks of executives. He himself never seems to have applied his plan throughout an entire organization. Many others do just the opposite, start at the top with the chief executive and his immediate assistants and apply the functional principle there but leave the rest of the personnel to be controlled according to the principles of line or line-staff. A third type of variation may be produced by applying functional control only within certain departments or to certain activities; or, at only certain times, as suggested by Dutton: "Occasionally a plan of organization is found which combines a functional organization for routine cases with a duplicate skeleton divisional organization to handle exceptions. The ordinary follow-up organization of a planning department is of this type."[17] Finally, the functional principle may in practice be introduced in various combinations with other types in hundreds of different ways and places throughout any organization of large size.

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[16] Thomas R. Jones, *op. cit.*, p. 22.

[17] H. P. Dutton, *The Principles of Organization* (New York: McGraw-Hill Book Company, Inc., 1931), p. 145.

The functional type of control organization is, as pointed out above, sometimes confused with an organization divided or departmentalized according to the functional or organic basis. Sheldon himself does not seem to be entirely clear upon this point, for he says: "A functional organization may be described, therefore, as one where the necessary activities of production are grouped according to scientifically determined lines of demarcation, irrespective of the particular nature of the products and processes involved."[18] According to the present view, however, the activities of an organization may be grouped according to the basis of organic functions[19] but controlled in accordance with the principles of line authority and responsibility. Such an organization, for example, would fit the definition given above of the departmental type.[20]

The cause of this confusion is the fact that the functional type is quite commonly found divided according to the basis of the functions or organs in the major divisions of the enterprise. However, the basis of knowledge, personality, or skill, as previously defined, is the proper basis for applying effectively the functional principle. Certain bases for the division of the work are obviously unsuited for functional control, for example, the bases of space, time, product, and in less degree still others. The functional type, more than any other, is dependent for its proper efficiency and coordination upon the proper basis for subdividing the work of the enterprise. Whenever authority or responsibility is for any purpose divided between two or more individuals, it is imperative, if friction and misunderstanding are to be avoided, that definite lines of demarcation be drawn between the spheres of activity of each. However, the basis for first dividing up the work, and the type of control over the individual doing the work, are not entirely one and the same thing.

There seems to exist also some degree of confusion between the functional type and the divisional form of the line-staff type as described above. For example, Mr. Dennison appears sometimes to regard as alternative the terms "staff" and "functional."[21] The confusion between these two types is not hard to account for because after all the two are quite similar in many aspects. Drury, in comparing the functional type of Taylor and the line-staff type described by Harrington Emerson, makes the following observation:

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[18] Oliver Sheldon, *op. cit.*, p. 114.

[19] Organic function as defined above, p. 115.

[20] See also Charles W. Gerstenberg, *Principles of Business* (4th ed. revised; New York: Prentice-Hall, Inc., 1926), pp. 196-198.

> In fact, it would seem that there is not much difference in practice between the management systems of Taylor and of Emerson, unless it might be in the spirit in which they are operated. Both are in reality types of a common species of functional management. There would seem to be no escaping the adoption of some such arrangement if scientific management is to exist at all.[22]

In continuing, however, that author suggests a possible basis of distinction:

> Functional management has the merit of tending to break down the sharp line of cleavage between superior and inferior. If the system were carried out to its logical limits, the highest official would become subordinate to others with respect to certain details of his conduct; while the humblest worker might quite properly be given a real authority in his own particular field.[23]

The line-staff type, on the contrary, maintains a strict line of demarcation between superior and inferior, and between executive and adviser. The fundamental distinction between the types of organization structure may be best explained, therefore, as a matter of the spirit, or the type or quality of authority manifest in each type.

TYPES OF AUTHORITY

The functional type of organization is often distinguished by its characteristic feature of divided authority.[24] The terms "authority" and "divided authority" are perhaps well understood; however, an additional word of explanation may be justified since each type of organization is characterized to a large extent by the particular nature of its authority. According to Robinson, "Authority, in general, includes two elements: the right to command that such orders as are issued be carried out; and the power to enforce their execution."[25] And as he states further: "Responsibility means being accountable for the performance of a duty, that is, being answerable for its discharge."[26] Now, as Gantt and others have insisted, authority and responsibility should never be separated, but be exactly commensurate in every individual for every duty.[27] For present purposes, authority and responsibility taken together may be understood as the equivalent of control. And if so, the terms "authority," "responsibility," and "control" may be used almost interchangeably, for wherever there is the one there should also be the other.

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[21] See Henry S. Dennison, *Organization Engineering* (New York: McGraw-Hill Book Company, Inc., 1931), pp. 142-145.

[22] Horace B. Drury, *Scientific Management* (2d ed. revised; New York: Columbia Studies in History, Economics, and Public Law, 1918), pp. 184-185.

[23] *Ibid.*

[24] *Cf.*, for example, the title, "specially delegated authority," Edgar W. Smith, *Organization and Operating Principles* (General Management Series No. 112; New York: American Management Association, 1930), p. 14.

Divided authority, or control, is likewise the equivalent of joint or multiple control, since the totality of control is in the hands of more than one individual. Both the functional and the committee types of organization are characterized to some extent by the nature of this division of authority and multiplicity of control.

The nature of a division of authority that often exists in a line organization is explained by Professor Dutton as follows:

> Authority for decision is sometimes divided, the decision being formulated by one man and approved by one or more superiors. In favor of this policy is the fact that the superior is thus kept informed of what is going on in his department, so that he can, without reviewing all aspects of the case, check those angles in which he has any doubt of the competence of the subordinates to decide correctly. The plan also provides a check on the judgment or integrity of the subordinate.[28]

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[25] Webster Robinson, *Fundamentals of Business Organization* (New York: McGraw-Hill Book Company, Inc., 1925), p. 185.

[26] *Ibid.*

[27] See L. P. Alford, *Laws of Management Applied to Manufacturing* (New York: The Ronald Press Company, 1928), p. 71.

[28] Henry P. Dutton, *op. cit.*, p. 158.

The line-staff type also makes use of divided authority:

> The chief clerk or other executive may in effect issue a standing authorization to the employee, to take orders for certain services or within certain limits, from some other member of the organization. In case of dispute or doubt, the service employee appeals to his boss, but otherwise he is at the disposal of the department or individual to whom he is assigned. This is the tacit relationship where the planning department gives work orders direct to the men, instead of through the foreman.
>
> The extension of this idea of tacit consent or general authorization permits introducing sufficient flexibility in the line organization without violating the rule of sole responsibility.[29]

In this way, therefore, divided control is effected in practice in the line and the line-staff types. However, it should be noticed that ultimate authority rests always in one person, the division being only between superior and inferior, and that only occasionally or conditionally.

Another plan that produces divided authority over the various members of an organization is based upon the principle of space, or territory. That is, when a worker is at one place he is, *ipso facto,* under the authority of the executive in charge of that place; and when he steps across a boundary—possibly imaginary—he comes under the authority of a different executive

Still another plan produces divided authority by utilizing the basis of time for separating the spheres of authority of the various executive officers over the workmen. An organization of this type is described by Shepard in these words:

> Where an individual owes a divided allegiance, it is necessary clearly to differentiate his functions and to define the authority over each one of them. If this can be done and, still better, if the times where he is occupied in any one function can be clearly set off from all others, no conflict of authority or division of responsibility need arise from this situation.
>
> Unity of authority and responsibility is nowhere more insisted upon than aboard a man-of-war, and no or-

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[29] *Ibid.,* pp. 150-151.

> ganization is more efficient; but the enlisted man in the navy comes under one officer when on watch, under another when at his battle station, and under a third when on boat duty. There is, however, never any doubt as to what officer has authority over him and is responsible for him at any particular time.[30]

A final plan for the division of authority is a division according to a certain prearranged sphere of activity for each of the various officers. These spheres of activity are laid out according to some basis such as that of skill, process, function, or the like. This final plan is the one ordinarily taken as characteristic of the functional type of organization, although the plans based upon space or time may, if properly instituted, also serve as a basis of organizing for functional control.

The different types of organization structure may be distinguished by the nature of authority in still another way. Authority was treated above from the standpoint of its extent or extensiveness; that is, the control of an executive officer over his subordinates throughout areas, periods of time, or spheres of activity. Another aspect of authority is what may be called its strength or intensiveness. As the first aspect was referred to as a matter of the division of authority, the second may be thought of as a matter of the dilution of authority. Dilution of authority follows the division of authority, in some degree, almost as a matter of course, for whenever any person is subject to the control of more than one superior it is practically impossible for any one of those superiors to exercise a control over the subordinate that is at all absolute. Although the proper plan of an organization may show that all lines of demarcation between functions are clearly and definitely drawn, in actual practice, if the functional principle is carried out from top to bottom, prime emphasis is placed upon every member performing his individual function, that is, getting his own task accomplished somehow. The functional officers, therefore, must be willing at all times to yield in order to permit subordinates to give proper consideration to their total duties, some of which are under the control of other officers.

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[30] George Hugh Shepard, *The Elements of Industrial Engineering* (Boston: Ginn and Company, 1928), p. 330.

Even in organizations of the strictly line type, there is in practice a large degree of dilution in the authority of all minor executives. As seen from the illustration quoted from Dutton, dilution may be effectuated through tacit consent or through an extensive application of the exception principle. Such dilution may also inhere not as a matter of consent or exception, but as a matter of declared policy. In fact, the chief and the major executives quite commonly reserve to themselves, or fail to delegate, the rights and duties of hiring, promoting, disciplining, and dismissing the workers. According to Florence the functions of policy formulation, planning the structure of the organization, and appointing the personnel, do not inhere in every executive function but belong to only the higher or administrative functions of the enterprise. He says: "While management is a relation between *immediate* superiors and subordinates, appointment of subordinates may be reserved to super-superiors and organization to super-super-superiors."[31] In the army and navy, for instance, all disciplinary action except for petty offenses is reserved for the courts martial; and, in establishments well unionized, labor usually insists that ultimate disciplinary power be vested in a committee composed of their own representatives. In fact, throughout modern industry in general there are not only well-established methods of appeal from the decisions of the lower-rank line executives but also personnel departments with some degree of primary control over the relations between executive and workman.

Thus, it may be said that control is diluted in the line type by the superior executive delegating only partial authority over the workman to the inferior or junior executives. Control is diluted in the line-staff type by allowing the advice and recommendations of the staff officers to become decisions and orders as a matter of course. In the functional type, control is diluted not by reserving certain authority ultimately to executives of higher rank, but by a division of authority among equals. That is, ultimate authority over the members of the personnel is lodged in no single individual except the chief executive himself. Each functional executive has full control of his respective function, but only a modified control over the respective functionaries. This modification of control brings about a dilution of authority to such a degree that terms such as commands, orders, bossing, and even authority itself are no longer descriptive of the relationships involved.

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[31] P. Sargant Florence, *The Logic of Industrial Organization* (London: Kegan Paul, Trench, Trubner and Company, Ltd., 1933), p. 143.

Miss Follett attempts to define this relationship as follows:

> We used to think that the various heads gave orders, that the different experts gave advice, but a new relation has entered in of recent years; there is something emerging which is neither orders nor advice. . . .
>
> It seems to me that our present methods of management have given us new interrelations of duties and responsibilities which have not yet found a place in our vocabulary or in our philosophy of management. What we are trying to do is to find a method by which advice does not coerce and yet enters integrally into the situation.[32]

The term "instruction" has been offered as a term descriptive of this relationship. As Mr. Henry H. Farquhar suggests: "The term 'instructional organization' is more descriptive of the real nature of this type."[33] Messrs. Bangs and Hart also distinguish between instructing and advising: "Taylor's functional foremen had definite authority and their work was really instructional in character rather than that of a purely advisory nature."[34]

Thus it seems there are three degrees of the dilution of authority. The authority of the line executive is theoretically absolute; he issues orders and commands which must be obeyed without excuse or exception. The functional officer, on the other hand, issues instructions or directions which are meant to be followed or carried out as given unless the subordinate receiving them can show good reasons for not doing so. The staff specialist, finally, issues advice, information, or suggestions which are to be taken for what the line worker thinks they are worth. Instructions do not command one to do, nor do they merely give suggestions or advice; instructions tell one authoritatively what he is supposed to do, and usually how to do it. The issuance of instructions presupposes an attitude on the part of all concerned that they will be taken or obeyed without question; the only thing needed is to know what to do or possibly how to proceed. One who disobeys a command is guilty of insubordination; one failing to carry out instructions is guilty of ignorance, inefficiency, or probably non-cooperation, unless he is able to show that the instructions of the several officers were conflicting, or some other good and sufficient reason. One who does not heed advice may be guilty of stubbornness or headstrongness at most; the real test that he must stand is the test of results accomplished, whether by good advice or bad.

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[32] M. P. Follett, "Leader and Expert," in Henry C. Metcalf, *The Psychological Foundations of Management* (Chicago: A. W. Shaw Company, 1927), pp. 227-228.

[33] Henry H. Farquhar, *loc. cit.*

[34] John R. Bangs and C. D. Hart, *Factory Management* (Modern Business Series; New York: Alexander Hamilton Institute, 1930), p. 38.

This discussion of distinctions between the degrees of authority among the respective types of control leaves one other matter to be cleared up. For, if only instructions are issued by a functional officer, is there no place in a functional organization for any such thing as orders? This question may be answered by drawing a distinction between orders and commands. A line executive individually may issue both, while functional officers must issue orders jointly and commands not at all unless as exceptions to routine.

A distinction between orders and commands may be taken from the army:

> Commands are used in the drill field, on parade, or in directing formations where precision of concerted movements is the objective. To achieve this end every soldier must instantly obey commands without objections. Since the public comes in contact with the army mainly on such occasions, there is a widespread conception that the army mechanizes men. The public does not know that the orders by which the vast majority of armies are guided are totally different. A correctly drawn military order

> assigns a mission, but does not give the detailed instructions as to how the mission is to be achieved, as when Admiral Dewey was ordered "to capture or destroy the enemy fleet." Such an order from a superior cannot be carried out by blind submission of a subordinate. It is a powerful challenge to his ingenuity and ability. He is proud that he is considered competent to accomplish the task. He knows that the responsibility for making good is his. . . .
>
> The distinction between commands and orders is scrupulously observed in sound military practice. It is bad form for a superior to encroach upon what is known as the "sphere of initiative" of a subordinate by issuing commands instead of orders. This practice is a recognition of the basic conception that authority is derived from competency and is not a prerequisite of position.[35]

In modern industry there is comparatively small place for commands in the military sense. Orders, however, constitute the chief instrumentality of communication from any one authoritative organ or member of the organization to another or others. According to Dutton: "Orders form part of the record system of the plant and should be aligned with other records. . . . It is a wise plan, where orders are numerous, to formulate a standard procedure as to authorization to issue various classes of orders."[36] Thus, the issuing of orders is not to be thought of as personally commanding or "bossing," but as a part of the impersonal information system telling those concerned what to do, etc. They are perhaps more akin to instructions than to commands. Dutton says again: "There is little difference in principle between teaching and order-giving. A good order takes cognizance of the total idea to be conveyed and of that part of the perception already in the mind of the recipient."[37] And, according to Kimball: "Under orders may be classified all instructions and directions issuing from the several departments charged with directing the work, making purchases, etc. . . ."[38] However, the distinction between functional orders and instructions may be retained for purposes of clarity, by regarding instructions as individual or personal orders.

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[35] C. R. Mann, *Army Organization in Industry* (New York: American Management Association, Annual Convention Series No. 53, 1926), pp. 4-5.

[36] Henry P. Dutton, *op. cit.*, p. 249.

[37] *Ibid.*, p. 248.

[38] Dexter S. Kimball, *Principles of Industrial Organization* (New York: McGraw-Hill Book Company, Inc., 1925), p. 107.

The source of the issuance of orders is different under each of the three types of organization. Under the line type all orders must emanate from a superior executive in direct control of those persons who are to execute the orders. Under the line-staff control orders are usually formulated and prepared by the staff, who either submit them to the line executive for approval and authorization, or transmit them to the line workers who accept them as authoritative through tacit consent. Under the functional type, orders are a joint product formulated by the various functional officers within whose spheres of activity such work may be. Each officer carries authority and responsibility for his respective part in the issuance of an order. He needs no further authorization either by direct approval or through tacit consent; his own signature is sufficient for the part he plays. The basic idea in giving orders, in making decisions, and in the exercise of authority under the functional type may be illustrated by again quoting from Henry P. Dutton:

> When the subordinate, by his possession and presentation of the facts, actually determines the decision, why not let him make it, subject only to coordinating and precautionary control by the superior executive?[39]
>
> Authority, according to this view, should not arise from delegation but from function. In other words, the man who possesses the facts should be the man who decides. Conformity to this rule would change the procedure of many companies which require "rubber stamp" decisions by higher executives.[40]

THE COMMITTEE TYPE

In discussing the three main types of organization, mention was made of the principle of multiple or joint control; and the functional type was regarded as an example of such control, in which executive authority over any member of the organization was placed in the hands of more than one officer. In this case, the work of the enterprise was divided into separate and distinct spheres of activity each of which was made the responsibility of one particular person. Multiple control may be effectuated, however, in a different way. Instead of specializing the officers according to different and separate functions, the duties of the same officers may be left undifferentiated as between them. In other words, each of several officials may have full and undivided authority over all phases of the work and over all subordinate members of the organization. Under this form of organization there may be distinguished two different types, one which may be called here joint control and the other collective or committee control. Under joint control, unspecialized and undifferentiated authority is placed in each of the officials, or, to use a legal phrase, control is exercised jointly and severally; under committee control all authority must be exercised collectively by the several officials.

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[39] Henry P. Dutton, *op. cit.*, p. 158.

[40] *Ibid.*, p. 157.

In the joint type of control each of the two or more control officers has full authority over the organization and full responsibility for results. All matters concerning any division of control according to functions or duties is settled between the parties directly concerned, but such settlement can in no way rob any one of the officials of his authority or relieve him of his responsibility. Illogical as such a plan may seem, it has many examples in history and in modern business. Instances in history of such more or less undifferentiated joint control are recalled by such pairs of names as William and Mary, Lewis and Clark, Mason and Dixon, and by the Roman triumvirate. In the early history of the joint stock companies, two governors were often appointed instead of one to head the enterprise.[41] The Muscovy Company in 1553 fitted out a fleet of three ships with no single official in charge, but with a general in command as the civil or military authority, a pilot general in charge of navigation, and a cape merchant in charge of trade.[42] This last example represents undifferentiated joint control in a modified form, for there is specialization of function but no single coordinating official who has authority over the specialists to say when and in what manner each is to be supreme, such authority being, at least temporarily, the result of joint agreement among the officials themselves.

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[41] See Wm. R. Scott, *The Constitution and Finance of English, Scottish and Irish Joint-Stock Companies to 1720* (Cambridge, England: Cambridge University Press, 1912), p. 9.

[42] See David Hannay, *The Great Chartered Companies* (London: Williams and Norgate, Ltd., 1926), p. 15.

The most important example of joint control in modern business is the partnership. There may be, of course, and there frequently is, a differentiation of duties among the partners, but this is not always the case. Many firms are commanded by two or more partners each acting with full authority on all matters coming before him. The partners must of necessity keep one another well informed of their activities and frequently take counsel together, but so far as all inferior members of the organization are concerned the word of any partner is supreme. Such a plan of control is quite naturally suited only to conditions and circumstances of infrequent occurrence, for although "two heads are better than one," two heads can rarely be found that can correlate their cerebrations so as to equal one in unity of action and definiteness of control.

Joint control is well recognized by law both as concerns members of the organization and outside parties. The actions of any partner are binding upon the firm and upon the other partners, even in some instances against the will of the other partners. Moreover, no general partner may be entirely excluded from a proper share in the control of the enterprise without legally dissolving the partnership.[43]

In the collective control or committee type of organization the various officials exercise power not individually, as officers in the organization, but as members of a group or body. In other words, the group is the controlling organ; the individuals exercise control only by virtue of their membership in the committee, their power being limited usually to the right to vote and the right to inform and be informed. There being only two members in a committee does not alter the situation or effectuate joint control; the two must act together on all matters. This relationship is also well recognized at common law, which requires the usual formalities of a committee meeting such as notification to members of time, place, and purpose of meeting, the keeping of minutes, etc., before any action taken becomes legally binding upon the organization.[44]

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[43] See *Uniform Partnership Act*, Sec. 18 (e).

Variations in either of these types of control, as characterizing an organization type, result mainly from the completeness with which the principle is applied throughout the structure of the organization. Indeed, it is rare that an actual organization is found in which either joint or collective control is applied in all phases of the work and from top to bottom. Usually committees are introduced only here and there to supplement an executive officer or to bring together several officers engaged in related functions. The partnership, though controlled at the top by joint authority, seldom has the principle applied any further down the line. The nearest approach to joint control in the lower ranks is found in some instances in the relationship of chief and assistant, in which the two share control substantially upon a basis of equality regardless of titles or rank. The corporation must be controlled, of course, by a board of directors, a committee from at least the legal point of view. The committee has wide use also in the field of public administration under the names of boards, commissions, etc. The application of committee control through all phases of an organization is also seldom found in actual practice, except in cooperative enterprises and the like, based upon democratic control.

In order to understand fully the use of committees in organization structure it will be necessary to take note of the several different kinds of committees and the purposes they may serve. As a starting point in distinguishing the many types and kinds of committees, Sheldon's classification and description may be cited:

> Committees can only be of four kinds; firstly, executive, in the sense of making decisions upon matters brought before it. Such a committee can decide, but cannot act. It must appoint some officer to carry through and supervise the execution of its decision. It is only executive to the extent that it makes decisions; their ac-

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[44] See John J. Sullivan, *American Business Law* (4th ed.; New York: D. Appleton and Company, 1932), p. 235.

> tual execution must rest with the main line of the organization. Secondly, a committee may be advisory, in that it brings together certain selected individuals to whom an official who requires special guidance in a difficult situation may refer. Thirdly, a committee may be educative in that it forms a means whereby an official may keep his staff regularly notified of events and policies, and thereby introduce them to the larger problems of management, thus forming a species of training-ground for others to succeed him. Fourthly, a committee may be co-ordinative, in that it brings together certain individuals, representing certain definite functions or parts of functions, for the purpose of ensuring that the work of each function is conducted upon lines corresponding to and harmonizing with the work of other functions.[45]

A better classification, however, and one more in consonance with the present method and purposes, would classify committees first according to the nature and extent of their authority and power to control the organization, and then perhaps according to purpose or function. Consequently, committees may be divided into four kinds: (1) those having more or less full power and control, (2) those having only partial or limited power, (3) those of a purely advisory or staff nature, and (4) those which take no action whatever but represent mere assemblies of certain individuals for purposes of discussion, contact, information, or instruction. In this classification proper place cannot be made for another rather large class of committees usually found in actual practice, that is, the committee having little or no power as such, but having great power and influence by virtue of its membership. The committee of this kind exercises its control through the principle of the "gentlemen's agreement" and through mutual understanding and common action by the individual members. Finally, it should be recognized that any classification of this kind cannot be to any large extent rigid and clear-cut, for the amount of authority is a matter of degree and consequently each class will shade off into other classes on either side.

Committees of the first class, those having full power, may be designated roughly as of three kinds called here the representative committee, the administrative committee, and the executive committee. All committees are of course representative, but this type is so styled here because its chief purpose should be to represent various individuals or factions which are to be united for the purpose of bringing into existence and perpetuating the life of an organization. It embodies the ultimate source of power, therefore, over the present or proposed organization and might properly be called the originative or creative committee. This committee being composed of various interests and factions and frequently of many members is often characterized by parties, by majority groups, cliques, and other political devices for the conciliation and compromise of opposing views. It is seldom fitted for the exercise of direct control over the activities of the organization. Its function should be confined to formulating in general terms the objective of the enterprise and the election of an administrative body or officer. An example of the representative committee is found in the stockholders' meeting of a corporation, in conventions, and the like, which usually exercise the legislative function in a broad or general way. Such committees wield ultimate authority over an organization but should seldom attempt to do more than create and sustain their enterprise.

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[45] Oliver Sheldon, *op. cit.*, pp. 123-124.

The administrative committee is exemplified by the board of directors of a corporation, the board of trustees of an association or institution, and many public commissions and other bodies. The power of such a committee over the organization is usually supreme, subject only to the authority of the source or agency that creates or perpetuates it and whatever control it may reserve to itself. Such control, however, in order not to rob this committee of its full authority must be exercised only indirectly, either by exercise of influence over its membership through election, by constitution and by-laws, or by audits, reports, and investigations. There must be, of course, a source of origin and of ultimate authority for every organization, but that source need not, and usually does not, stay on the job to administer the affairs of the organization. Such a source, as exemplified by the representative committee, usually delegates to a committee of the administrative type much more actual control over the organization than it retains to itself. This relationship is well recognized in corporation law, for the assembled stockholders usually cannot legally perform the functions of the board of directors in administering the affairs of the company.[46]

The executive committee may be equally well placed in either the first or the second class as outlined above. As a committee having full power, it is a "committee with power to act." It is executive not in the sense that the committee itself serves as a body of officials performing the function of execution displacing thereby an executive officer, but in the sense that it supervises the execution of the program and the policies of a higher authority. It is usually concerned with the supervision of the work of the executive officers of the organization, representing the administrative or the creative authority over the organization. In many cases this committee is a subcommittee of an administrative board or group, having power to act for the whole in certain matters, or to act on all matters of an emergent nature in the absence of a meeting of the whole body. Whenever this committee has a permanent existence it should be regarded as a link in the chain of direct command in the structure of an organization.

Committees of the second main class may be studied from two points of view, first as to what has been called the strength or intensiveness of authority, and, second, as to the extent of power over the various activities and functions of the organization. These two aspects of authority, it will be recalled, are not entirely separate and disconnected but closely related and varying in somewhat the same direct proportions. The truth of this relationship is apparent when it is remembered that each member or organ functions not for itself but for the whole organization and even in performing within its own sphere of activities it must often stand in abeyance to the proper functioning of other members. Thus, whether a committee is limited in power directly or functionally, it should be considered of the second general class.

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[46] See *Continental Securities Company v. Belmont*, 206 N. Y. 7, 99. See also, Essel R. Dillavou and Charles G. Howard, *Principles of Business Law* (revised ed.; New York: Prentice-Hall, Inc., 1935), p. 329.

Direct limitations upon the control of a committee may be effectuated in several ways. One of the most common ways is to require the approval of some higher or administrative authority before the actions of the committee become effective. Another is to reserve veto power over its actions to some other member or body in the organization. Limitations may be made also by requiring for authoritative action a two-thirds or even a unanimous vote, a requirement which may make a committee entirely subservient to any one obstinate member or the agency appointing him. Mention may also be made of the principle of joint control by committees, an example of which is the bicameral legislature.

Committees may be limited in power indirectly or functionally in as many ways as there are functions to be performed. However, it is often possible to group the various activities under a comparatively small number of general or compound functions suitable for committee control. Mooney and Reiley in treating of the primary staff functions in every organization offer a threefold classification well suited to committee functions:

> In every organization there must be some function that decides or determines the objective and the procedure necessary to its attainment, another that moves through this procedure to the attainment of this purpose, and a third that makes interpretative decisions in accordance with those rules or laws of procedure that have been predetermined. These three functions, which may be called the *determinative*, the *applicative*, and the *interpretative*, are related as principle, process, and effect. In secular government they are always known as the legislative, the executive and the judicial functions.[47]

These three committee types, as viewed here, are to be distinguished from committees of similar function in the first and third general class only by the strength of their authority over the organization. The legislative committee compares closely with that described above as the creative or representative type, except only that the legislative committee goes somewhat more into details. It attempts to lay down rules and procedures for the conduct of the organization, and performs in a general way the function of planning for the enterprise as a whole. The executive committee corresponds to the executive committee described above with the exception that the present type does not have "power to act." Its proper function is to provide for the execution of the resolutions and decrees of the legislative and judicial committees or supervise execution subject to review by an administrative body. The judicial committee is seldom found as such in modern industry, it being usually confused with committees of the administrative or executive type which ordinarily exercise judicial functions. It should be distinguished, however, by the fact that its function is to act as a court, to try particular cases that have arisen, and to hand down decisions that will be executed by proper authority.

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[47] James D. Mooney and Alan C. Reiley, *op. cit.*, pp. 47-48.

These three kinds of committees may be more clearly distinguished by regarding the legislative committee as one which is concerned with matters for future action by the organization, the executive committee as one concerning itself chiefly with the present, and the judicial committee as having to do only with past actions. The judicial committee stands thus as a reviewing agency, the main function of which is to pass judgment on past actions, to settle disputes, and to criticize and possibly correct. Seldom are these three functions recognized and separated in the structure of industrial organizations as they are, of course, in our governments. Nevertheless, they may be recognized to good advantage in many instances and represented by committees which may either typify the organization structure or be superimposed upon an organization of a different basic type.

The third general class of committees, the staff or advisory committee, has the authority, as its name implies, of a staff member of the organization. This committee is formally organized and makes decisions just as do those of the two classes previously discussed. Its decisions, however, are not obligatory or binding upon any member of the organization; being in the form of resolutions, recommendations, or reports to some person or body having executive authority, they are to be taken as mere information or advice. Although the decisions of advisory committees are dependent upon their voluntary acceptance by another before they become effective they cannot usually be ignored entirely by such other authority. Minutes are kept; all correspondence, reports, and communications are filed for future reference; and frequently the committee has the right to request formal replies to its actions from the executive officers. Advisory committees perform a wide variety of functions in an organization, some of the more common being those concerned with research, planning, coordination, budgets, facilitation, disputes, suggestions, welfare, and general staff counsel. This class of committees is more prevalent in modern industry than any other; in fact, according to some it should be practically the only kind used below the administrative level.

The fourth class of committees could be more properly called an assembly or class than a committee, for its purpose is not to act as a body or make decisions. It makes no resolutions and takes no vote, except, of course, concerning its own internal affairs. Its function in organization structure is to bring certain individuals together as a body for some stated purpose, such as to convey information, secure mutual understandings, form personal contacts, and the like. The educative committee, the discussion group, the formal conference, and many classes and meetings are of this type. The fact that such a committee takes no action that is conveyed formally to another member of the organization does not deprive it of its usefulness in modern industry. It is an effective device for securing the cooperation and good will of both officers and men of all ranks and functions, and one of the chief agencies for indoctrinating the personnel on all company matters. This kind of committee is also widely used in modern business organizations, possibly more so than most authors realize, for it is not often shown on the organization chart or taken into consideration as a part in the structure of organization control.

Thus an attempt has been made to classify and distinguish the various kinds of committees. The primary classification has been made according to vertical relationships, i.e., according to the amount of power possessed by the group over any other member or body in the organization. In treating the structure of organization control, this is the vital characteristic of any member or structural unit. Lateral or functional relationships have not been fully treated or identified because such relationships are as numerous as there are different kinds of activities to be performed by the organization, and cannot be treated successfully without some knowledge of the technological nature of the work process involved and the particular function it is desired that the committee should perform.

However, the committee, of whatever degree of authority, by its representative nature presents a plan whereby persons performing various individual functions may be brought together and given authority collectively to oversee or supervise a major or compound function of which their individual functions are the parts. Certain functions by their nature carry with them a certain amount of authority and control over various members of the organization, and a committee which brings together the individuals in charge of them even for discussion may through mutual understanding and concerted action by the various members acting individually have far greater power or influence than is often recognized or shown on the organization chart. Consequently, whenever committees are formed for any purpose in an organization they should be given a definite status in the structure with their duties and authority made known to all.

SUMMARY AND CONCLUSIONS

The usual method of procedure in treating of the various types of organization is to take up each type and complete the discussion concerning all aspects of that type before another is introduced. The present method, however, has attempted first to define each of several types and distinguish them clearly from all others, leaving the question of the relative merits of each type for discussion in the following chapter. This method it seems would serve better to differentiate the various features that typify organization structure.

In conclusion, attention should again be called to the distinctions made and to the bases for thus differentiating the several types of control organization. In the first place, it should be recalled that the problem of differentiating the types of organization, which are for the purpose of controlling the activities of the personnel, is not to be confused with the problem of the plans or bases for dividing up the work to be done by an organization. The latter of these organizational problems, usually referred to as the problem of departmentalization, is a part of the problem of the organization of work, and its proper solution is determined chiefly by the technological nature of the productive process. The control organization is superimposed on the work organization.

In the second place, it should be remembered that the distinction between the several types is essentially a matter of degree, the degree of authority or control possessed by the various members in the organizational structure. Accordingly, a line officer is one having full or complete authority; a functional officer, one having limited or circumscribed authority; and a staff officer, one having *per se* no authority. Committees are classified also in accordance with this scheme.

Furthermore, it should be recalled that there are many variations, mutations, and combinations in the four main types. In fact, the types designated as the departmental and the divisional are often considered to be separate and distinct types. It should be noted that the order in which the various types and subtypes are taken up is that of complexity, suggesting therefore an evolutionary development in organization structure. The order is as follows: (1) pure line, (2) departmental, (3) pure or ordinary line-staff, (4) divisional, (5) functional, (6) committee, or possibly, functional and committee. Finally, it should be again recalled that both the functional and the committee types are types of joint or multiple control. With the various types thus defined and differentiated, a comparison of the relative merits of each type will be undertaken in the next chapter.

CHAPTER VI

COMPARISON OF ORGANIZATION TYPES

The method usually followed in comparisons of organization types consists in enumerating the advantages and disadvantages of each type. Accordingly, this method is followed in the present chapter. Before proceeding, however, a word of explanation concerning the purpose and the utility of such a comparison may prove helpful.

In the first place, it may be advisable to explain the meanings of the terms "advantages" and "disadvantages" as applied to the several organization types. The word "advantage" is commonly used in organization and management literature to include somewhat loosely such concepts as the following: favorable features, elements of strength, desirable characteristics, good qualities, particular merits, etc. Likewise, "disadvantages" mean, roughly: weaknesses, faults, shortcomings, difficulties in application, unfavorable features, objections, and the like. Thus, for instance, if a certain difficulty usually arises in instituting or establishing a particular type, that type is said to be at a relative disadvantage to another in connection with which that difficulty seldom arises.

This terminology is entirely adequate for all practical purposes, since it is sufficiently accurate to indicate that before adopting a certain type steps must be taken to overcome the difficulty. The fact is that, if the difficulties usually arising in establishing any type are known and understood, they may often be counteracted by the application of certain remedial devices and policies. For example, the great difficulty experienced by line officers in properly discharging their numerous duties may be alleviated partly by adopting the "two-plane plan of organization" in which each line officer is given an executive assistant who possesses complete authority over all other members of that line unit. This plan remedies the particular difficulty, but if applied extensively it would tend to overload the organization with executive personnel, which, because of the extra expense for executive salaries, would still result in a disadvantage of the line type. Thus, any unfavorable feature often appearing in connection with a certain type may result in a disadvantage of that type, and consequently it should be pointed out.

In studying the types of organization one distinction must be remembered. This is the distinction between the division of the work into stages, processes, functions, or operating units, and the setting up of a type of control for these units. As pointed out in the preceding chapter, many students confuse these two different phases of organization procedure. The division of the work into its logical parts is usually dictated by the technological nature of the production process. These parts so determined then become the operating units which must be controlled by some type of control organization. Their relationship with one another and with the whole process quite often points definitely toward a certain type. In other cases, however, no particular type is indicated by the technology and the organization of the work or its surrounding conditions, or, at best, two or more alternatives are indicated. For example, widely scattered units with poor means of communication point toward either a line or a divisional organization. On the other hand, whenever much technological knowledge is required in the process of production, either the line-staff or the functional type is suggested. Again, the change from a process or equipment grouping of work to a belt-conveyor system may suggest a change from the departmental to the functional plan of control.

The value of comparisons of the relative advantages and disadvantages of the various organization types, such as this, has been previously questioned. The main fault with such comparisons, however, is that they usually imply that a certain type is advantageous, or disadvantageous, as the case may be, for all purposes and in all situations. If such be their implication they are indeed misleading. There is no one particular type that is best, or better than another, in every situation. The most advantageous type is determined in each instance by the technology of the system of work, the purposes and policies of the organization, the work it must do, the conditions under which it must operate, and the facilities at its disposal. The structural type of an organization must be built to fit the particular work situation and developed and modified as time goes on and conditions change. Thus, under certain conditions one particular type may be best, and under different conditions the same type may be at a very great disadvantage. The object in enumerating and explaining advantages is thus not to prove that a certain type is best or most advantageous but merely to point out the relatively good features of that respective type.

Another fault with many comparisons of organization types is that they also imply that in any particular organization one and only one type should be used throughout its entire structure. Such an implication is likewise wrong. It is not necessary that one type be adopted for all divisions, departments, or functions in a large and extensive enterprise—much as symmetry and uniformity may be admired by the more fastidious. A line organization may be supplemented by a staff in one division and by committees in another, and in still another a pure functional type may be established. Moreover, an organization may be controlled, for example, by committees on the administrative level but by line or functional officers within the various divisions or departments. Or there may be shop committees to supplement the lower-rank executive positions, but a specialized staff to aid and advise the chief executive.

Comparisons of the relative merits of the various structural types do, however, have their usefulness when their proper limitations are duly considered. There are, as indicated, certain situations in which a particular type may be expected to serve better than another, and in these situations the advantages of the particular type become apparent and may be enumerated. In another situation the same type may prominently display its disadvantages. Moreover, certain strong features and certain weak features are contained in the very structure of each type. No structure in building houses or in building organizations is ideal for all purposes, nor is a particular structure always totally unsuited for all purposes. The truth of the matter generally is that every structural type is usually found upon final analysis to be a compromise. No single type will ever contain all good features and no disadvantages. For example, if stability is gained, flexibility may be lost; if flexibility is gained, complexity may be a necessary accompaniment; and if adequate provisions for emergency are made, they may cost too much. To gain all the good points and avoid all the disadvantageous features is often the old problem of "eating one's cake and keeping it too."

The proper application of comparisons of types and of general organization principles has been summarized by Sheldon, who says:

> We may now review the practical application of each form of organization. Undoubtedly, a modicum of good resides in each, and it is not unlikely that the best form of organization will contain some elements of all. It is further open to doubt whether a practically ideal form of organization, applicable to any concern, can exist. Forms will vary according to the peculiarities of each business. This does not, however, discount the hypothesis that there is an ideal principle governing forms of organization, and that, in the practical interpretation of that principle, certain constant factors necessarily ensue, whatever may be the variable features in such interpretation.[1]

Finally, in a study of this kind which deals with organization types in general, without reference to particular functions, enterprises, or industries, many points of view and many sources of information must be taken into consideration in order that omissions of either advantages or disadvantages may be reduced to a minimum. The method of preparation has been to collect from all available sources the many statements as to the particular merits of each respective type, then to classify and group together all statements in close agreement concerning each respective advantage or disadvantage, and, finally, to summarize these statements and if possible quote representative statements bearing out the summarizations. The method of presentation, therefore, will be to give in summarized form the principal advantages and disadvantages of each of the four main control types.

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[1] Oliver Sheldon, *The Philosophy of Management* (Sir Isaac Pitman and Sons, Ltd., 1923), p. 117.

LINE ADVANTAGES

1. The most striking advantage of the line type of organization is its simplicity. Nothing could be simpler than arbitrarily dividing up the work an organization has to do into units of some kind, and putting a person in charge of each. This having been done, the chief administrative officer may feel—and in some instances rightly so—that his troubles with internal affairs are over. He tries to select the right men for his assistants and then leaves it up to them. If they succeed, well and good; if they fail, never bother about the "why and the wherefore," kick them out and try to get better men to replace them. Such a formula is simple; such a plan is easy if only the work permits of a natural division into clearly differentiated units; and such is the practice in many profitable enterprises.

2. The directness of line authority is another advantageous factor. There is no doubt in the minds of either officers or men as to who is boss. Frequently, the first instructions given to an initiate in such an organization is "just remember who is boss around here." Authority is delegated from the chief administrative officer to his executive assistants, who in turn delegate such authority as they see fit to their subordinates, and it is only in exceptional cases that authority so delegated is interfered with by a superior. This naturally saves much confusion in eliminating conflicting orders and contradictory instructions.

3. Another advantage arises from the singleness and completeness of responsibility. Every working division of the organization is placed under the charge of one person, who is in turn held absolutely responsible for the productive results of that division. As soon as trouble can be localized within a certain division, other troubles cease so far as the chief administrator is concerned, for there is no doubt as to who is to blame or as to who should correct the matter. This practice is psychologically effective, for no man will

work harder to accomplish some objective than when responsibility for results is placed squarely and unconditionally upon his shoulders. According to Duncan: "The great advantage of this departmental system is that the responsibility can be fixed; it is possible to train men to fill the jobs, and it is impossible to have any shifting of responsibility, because the men must show results in output, and not prove that they have given or followed instructions."[2]

4. Quick decisions is another attribute of this type.

> Because good line organization is adaptable, and because it provides for instant, final, indisputable decisions by a competent boss on the spot, it is especially fitted to deal with emergencies; and it is in those organizations that deal habitually with emergencies, such as the army and navy, the police and fire departments, that we find the most highly developed line.
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> Line organization possesses the following virtues: strength, adaptability, and capacity for dealing with emergencies. These qualities are so valuable that the Line should form the center and core of every industrial organization, and all other organization should be built about it and upon it.[3]

5. Ease of discipline naturally follows definiteness of authority. The one-man-one-boss system leaves no doubt in the mind of any worker as to whom he should obey or try to please. With the definiteness and completeness of authority here given to one person over another, matters of discipline should never reach large proportions. Such matters are settled—whether right or wrong—on the spot and once and for all, unless later challenged by some higher authority as an exception to regulations.

6. The same completeness of authority that makes for ease of discipline makes it possible in many cases to employ a lower grade of intelligence among the workers. It requires less intelligence to go and come in obedience to the per-

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[2] John C. Duncan, *The Principles of Industrial Management* (New York: D. Appleton-Century Company, 1917), pp. 194-195.

[3] George Hugh Shepard, *The Elements of Industrial Engineering* (Boston: Ginn and Company, 1928), p. 304.

sonal instructions and demonstrations of a good boss than it does to have to assimilate and coordinate the instructions and advice of several. Little thinking is required of the workman; he merely does as he is told. Thinking is the duty of his boss. Such can be true, of course, only when the work to be done is simple and of a routine character.

7. A plan that places so much emphasis upon the bosses must naturally produce aggressive all-round executives. A foreman who can make good under this type and with such responsibilities as are his must be a man of unusual abilities, and his training as such will fit him for even greater executive responsibilities.

8. A practical advantage is also usually found in lower overhead costs. There are few elaborate information files, service records, charts, and planning schedules; all these are kept mostly under each foreman's hat. Each plans his own work, keeps his own books, and handles all accessory activities himself. His own memory devices store information for his own use, and the management higher up is usually satisfied with an occasional report. Overhead, as such, is at a minimum.

LINE DISADVANTAGES

1. The greatest difficulty in organizing according to the line type is that of first mapping out the divisions of the work which are to form the line units whenever these are not definitely indicated by the technology of the work. In the departmental type, especially, the total work to be done by the organization must be divided into departments or sections for convenient performance, and it is not always the case that the work process falls naturally into a small number of logical parts. Whenever clear-cut lines of demarcation between the activities of different departments cannot be drawn there is bound to be confusion and disharmony in the organization, because this type does not contain special machinery for handling departmental interrelationships. It is, therefore, ill suited for large-scale, complex, productive processes or for industries requiring intricate departmental integration and cooperation.

2. A second weakness of the line type is closely allied

with the first. It is the lack of specialization of personnel. There is, in this type, no differentiation between thinking and doing, or planning and execution. The workmen or minor executives often decide how, and sometimes when, they shall do their work. Moreover, skilled tradesmen who are paid high wages spend much time at a type of work that common laborers with a little instruction could do equally well. Neither does this type permit the development or training of specialists within the organization. This type on the whole makes little use of the great advantages resulting from the division of labor.

3. Even in the best of line organizations, the coordination of the various units is usually none too good, and interdepartmental cooperation, if maintained successfully at all, is due to able leadership, close supervision by the higher authority, or to some factor not provided for in the structure of this type. This is necessarily so because each department head is responsible only for the success of his own little bailiwick. "Nor is such a manager required to any great degree to exercise the gentle art of co-operation with other officials, with the result that there is a decided tendency and, indeed, a temptation for him to retain the attributes of the autocrat."[4] /Thus each department or line unit tends to become a separate and distinct entity held to the organization only by the authority of one higher executive, and instead of one unit assisting and supplementing another, friendly rivalry for efficiency becomes keen competition, jealousy, and, at the worst, departmental sabotage.✓

4. It is evident that this type of organization places too much emphasis upon the bosses and executive officers. It concentrates control too much. It is too highly personal, depending upon strong personalities with full authority rather than upon structural arrangements. It is based on the assumption that ". . . they should take who have the power and they should keep who can."[5] However, the

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[4] Oliver Sheldon, *op. cit.*, p. 136.

[5] Henry H. Farquhar, "Functional Organization," in The Taylor Society, *Scientific Management in American Industry* (New York: Harper and Brothers, 1929), p. 136.

dominating personality needed to get this authority, owing to the manner of selection and promotion, is not always the one best qualified to have it.[6] This individual will absorb unto himself more functions than he can carry, considering the good of the whole organization. Because of the great dependence on the man—the chief executive in each department—the organization also lacks permanence and stability. It is not often that executives are interested in their successors in office. In fact, it might be to their individual interests to see to it that at any time there are none at hand. As Westbrook observes:

> A really successful line organization is usually dominated by a single strong man and if anything happens to put him out of the running the whole concern is likely to go to pieces or at least suffer severely. Dominating personalities are also likely to kill ambition among others lower down in the organization and hinder the natural development of managerial ability in the ranks of the personnel.[7]

5. Owing to the multiplicity of duties of the executives, inadequate provision is made for growth and balanced development in this type. In the words of Sheldon:

> The effect of the Departmental form or organization is, as it were, to impose a glass-frame on sunflowers. Whilst it certainly affords effective control, it definitely prevents growth. When the manager is fully occupied, growth stops, or, if it goes on, it continues outside the province of his control. It creeps outside the glass-frame, and is wasted. Moreover, no manager, except in the smallest conceivable department, can be expected to give full attention to every function, with the result that the functions develop unevenly; some grow, others remain stunted.[8]

This same disadvantage is emphasized by another author as follows:

> The disadvantages of the line organization are that

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[6] See *ibid.*, p. 137.

[7] Francis A. Westbrook, *Industrial Management in this Machine Age* (New York: Thomas Y. Crowell Company, 1932), p. 24.

[8] Oliver Sheldon, *op. cit.*, p. 135.

> usually, as soon as it attains any considerable size, its complications and ramifications are such that it is next to impossible to find enough executives with the necessary multiplicity of qualifications to carry it on. The heads are engulfed in details and the need of specialists, for which there is little if any place in the line organization, immediately becomes apparent.[9]

The problem of securing able executives at a reasonable price is indeed a great one. It is often the case that the high salaries paid the executive officers more than offset the financial advantage gained by the low salaries of workers and the lower overhead due to the absence of other organization machinery. Moreover, even able executives do not always compensate for the lack of the services of experts who assist in keeping proper records, in conducting research, and in furnishing counsel.

LINE-STAFF ADVANTAGES

1. The most important thing that may be said in favor of the line-staff type of organization is that it retains many of the advantages of the line type and at the same time it avoids many of its disadvantages. According to Florence: "A system must be found which will strike an efficient balance in the division and concentration of work and control. Such balance applied in industry is probably nearest approached by the line and staff system."[10]

It introduces the staff for advice and facilitation, yet retains the undivided authority and the full responsibility of the line type. The staff is not concerned with authority for control; its essential attribute is knowledge.[11] There is therefore no weakening of line discipline by a divided allegiance or a multiplicity of bosses.

2. Moreover, by the addition of a staff to the regular line hierarchy, the organization is made flexible. New activities may be added or developed, or experiments may be undertaken without interrupting line procedure. As stated by Dean Matherly:

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[9] Francis A. Westbrook, *op. cit.*, p. 23.

[10] P. Sargant Florence, *The Logic of Industrial Organization* (London: Kegan Paul, Trench, Trubner and Company, Ltd., 1933), p. 133.

[11] See George Hugh Shepard, *op. cit.*, p. 322.

> Line and staff organization enable an existing enterprise to make a start toward scientific organization without disturbing the line. It is possible merely to graft the staff on to the line without in any way affecting existing line officers. Staff officers can be added to analyze, test, record, investigate and supplement the work of line officers and line officers merely left to execute according to staff standards and methods.[12]

3. Perhaps the greatest advantage of this type comes with the introduction of the specialist into the ranks of the organization. In the line type this faculty was provided, if provided at all, by "calling in the expert," or consulting professional specialists. This practice has its difficulties. "The introduction of a stranger who even indirectly tells every one how to do his job will never be a popular mode of increasing efficiency. . . ."[13] The staff specialist, on the other hand, becomes a fellow worker who stays on the job for continuous advice and assistance, and for praise or blame whichever is his due. He is brought into the organization "to provide what is missing, whether in organization, recognition of efficiency principles, or their application."[14] Emerson states also that: "The perfect organization for industrial up-building and efficiency is one in which specialists formulate the underlying principles, instruct as to their application, and relentlessly reveal both their observance and neglect."[15]

4. Another advantageous characteristic of the line-staff type is that it makes greater use of the principle of division of labor, and of the distinction between the psychological types of introvert and extrovert. This point is further elaborated by Dutton:

> One reason for the separation of staff and line duties is that the ability for clear and disinterested reasoning is not always contained in equal degree in one man, with

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[12] Walter J. Matherly, *The Principles of Business Management* (Vol. I, mimeographed; Gainesville, Florida: The University Press), p. 76.

[13] Oliver Sheldon, *op. cit.*, p. 141.

[14] Harrington Emerson, *The Twelve Principles of Efficiency* (5th ed.; New York: The Engineering Magazine Company, 1919), p. 53.

[15] *Ibid.*, p. 52.

the driving force of assurance and desire, or the persuasive ability, necessary to put plans into effect. The staff type of mind often derives its emotional stimulus to effort from intellectual curiosity and the pleasure and sense of power that come from creative thinking. Having carried the problem to solution, that hunger is satisfied, and the stimulus to further effort in application is small. It works well therefore to have the end sought by the student become the means by which the operating official satisfies his own hungers for power and leadership. The operating man, in turn, is satisfied with a result or end which to the stockholder is a means of securing dividends or profits.[16]

5. The staff not only adds strengthening units to the line but it also strengthens the units already there. "One of the greatest values of staff is its ability to study and correct matters involving interdepartmental relations."[17] Staff officers, being interested in the organization as a whole and not being under any one departmental executive's control, can act as go-betweens. They can facilitate coordination and cooperation and aid in giving unity to the entire structure. Again, staff assistants are able to relieve line executives of much detail, routine, or "office work," freeing their time for more essentially executive matters. Moreover, by bringing experts in the various fields of knowledge into close contact with line officers, valuable training is afforded both classes of officials. Through these contacts knowledge may be gained in a short time which would have required years to obtain through experience. Finally: "Information actually collected and coordinated can no longer be spurned, staff officers will be more open to outside changes of thought on technical inventions, and above all they will be men of special skill, experts in the full sense of the word."[18] Their collective advice will stimulate line officials to keep abreast of the times and to strive for improvement.

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[16] Henry P. Dutton, *Principles of Organization* (New York: McGraw-Hill Book Company, Inc., 1931), p. 119.

[17] C. E. Knoeppel, *Organization and Administration* (New York: Industrial Extension Institute, Inc., 1921), p. 370.

[18] P. Sargant Florence, *op. cit.*, p. 136.

LINE-STAFF DISADVANTAGES

1. A main disadvantage in the line-staff organization is the confusion of line orders with staff advice. This is especially true of the divisional form, or any form in which staff officers advise the men down the line, and it becomes a still greater evil when there are many staff officers, and these not thoroughly coordinated. A multitude of advisers is confusing, requiring of the workers and junior executives a high degree of intelligence, and of experience within the organization, to understand and to correlate orders with advice. The only answer to this problem is more and better coordination, which may require a more elaborate system, better training, extra staff personnel, or possibly the superimposition of the committee type. Some features of all of these may be necessary. According to Florence the committee is indispensable, for he says: "Whenever the pure line system of command is abandoned and co-ordinate officers are created either for functional or advisory paperwork purposes, it is essential to efficiency that a common meeting-ground be found for ideas and complaints. This meeting-ground is obtained in committees. . . ."[19]

2. It is sometimes asserted that the psychology of the staff relationship is wrong. Since staff officers have no authority to enforce the acceptance of their advice and no responsibility for results accomplished they may be inclined to advise somewhat promiscuously and carelessly. This becomes especially true when line officers frequently consider staff counsel but lightly or ignore it altogether. Any person who knows that his efforts are not appreciated or virtually ignored will naturally incline toward carelessness. He will hesitate to spend long hours of meticulous study and research on something regarded by others as of no value.

The psychology of the situation may be equally bad on the part of the line officers, for it may furnish them an excuse for failure. When things do not go well it is a weakness of human nature to blame someone else, and in this type it is always the staff, or the "office crowd," so-called, that somehow is at fault. Of course, there can be no "passing the buck" to the staff, for it is not accountable for results; but it does serve as a handy excuse, or merely as someone to serve as the brunt of line failures. To sum up the situation:

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[19] *Ibid.*, p. 137.

> The chief disadvantage of line and staff organization is that a clash of interest is likely to arise between line and staff officers. The line is apt to regard the staff as meddlers and the staff is apt to regard the line as autocrats. The line is likely to treat the staff as mere theorists unfamiliar with practical operations and the staff is likely to treat the line as rule-of-thumbers unfamiliar with the best practices.[20]

3. Aside from the pure psychology of the situation, knowledge gained by the staff sometimes dies with the staff. Staff members are often not sufficiently good salesmen to sell their ideas to the line executives, nor are line executives always sufficiently good leaders to lead specialists and those trained in the various fields of scientific knowledge. Thus, because of the lack of staff authority this type does not give the highest development to specialization and coordination of labor.

4. In some cases it seems to be understood that the staff is that part of the organization which does all the thinking—the brain of the enterprise—and that the line is therefore entirely relieved of this function. Such a condition could only lead to atrophy on the part of line officers and men. Some of the world's best thinking has been done on the job and in direct contact with the problems. Of course, there is a place for thinking in terms of generalities, and for theoretical research, but for the hundreds of small problems involved in a complex industrial process those on or close to the job must be depended upon for much creative thinking. By concentrating all research, planning, and technical information in a separate corps, proper attention may not be given either to the needs or to the contributions of line officers and workers. This disadvantage may be overcome in part of course by an effective suggestion system, by

[20] Walter J. Matherly, *op. cit.*, p. 77.

a system of rotating line and staff workers, and by conferences, classes, etc.

5. Sometimes it is claimed that the staff bothers and pesters the line too much. Frequently, friction between the two results in the staff being whipped into a position of inferiority and assigned to certain more or less routine duties, or else the staff gains the ascendancy and usurps line authority. As Florence has put it: "There is always a tendency inherent in the staff system for the creation of a superior highbrow set who are pictured as sitting at headquarters devising paper forms and questionnaires to annoy the executive line officers and men doing the 'donkey work' at the real front."[21] Mooney and Reiley place particular emphasis upon this feature:

> One observation and caution is essential in connection with staff service, a caution that is enforced by all the lessons of history. This caution refers to the tendency of staff functions, under certain circumstances, to usurp line authority. . . . A tendency of this sort may appear in an industrial organization before line authority is even aware of it. Its first symptoms are manifested in a disposition among employees to pay more attention to horizontal than to perpendicular contacts. No efficiency in staff service can justify such a spirit, for the staff is, after all, a strictly adhering function; it has its lawful place in organization only in so far as the collective wisdom of the counselors reflects and projects the vision of the leader.[22]

Thus, it might be noted, the line-staff type tends unconsciously to evolve to the higher functional type. Staff officers being responsible for advising as to certain activities concerning which they are particularly informed tend naturally to assume some degree of control over the application or execution of their advice. Likewise, the line foremen and workmen gradually learn to respect the authority of superior knowledge, regardless of position, and go straight to these staff experts for instructions which they can follow more accurately and more enthusiastically than they do the orders backed only by official rank and position. This very relationship, as a matter of fact, is in essence the equivalent of the functional principle of control. Under the functional type, it will be remembered, the specialist does not merely produce expert information, give advice, or check reports of operations, but he follows through all phases of his particular specialty. Moreover, he is held directly responsible for its proper performance by any member of the organization.[23]

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[21] P. Sargant Florence, *op. cit.*, p. 137.

[22] James D. Mooney and Alan C. Reiley, *Onward Industry!* (New York: Harper and Brothers, 1931), p. 513.

FUNCTIONAL ADVANTAGES

1. The most fundamental advantages of this type of organization arise from its employment of the principle of division of labor applied to both the workers and to the management. This scheme makes the greatest use of personnel specialization of any of the structural types, and consequently it is able to gain the maximum results flowing from its application. This advantage is basic, and it is manifested in several ways.

2. In the first place, the establishment of jobs and control units is facilitated. It is possible to specialize these according to any logical basis, or even according to several bases at the same time. In the line or departmental type a section or subdepartment must be placed absolutely under one, and only one, major division or department, whether or not it fits in so well with the other activities carried on there. A function under functional control, on the other hand, does not have to be so confined. It may be placed under one or under several major functions, depending only upon the number to which it is a contributary. This latitude greatly simplifies the problem of first mapping out control units where many and various activities are carried on by an organization, and it also eliminates the misfit activities often found in line departments.

3. The high degree to which personnel specialization is carried under the functional type makes it possible more nearly to fit the jobs and functions to the capacities, the aptitudes, the training, and the personalities of workers and officials as they may be found to exist. One of the greatest

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[23] *Vide supra,* Chap. V, *s.v.* The Functional Type.

difficulties in manning any organization is to find or develop the men with just the right abilities to satisfy all the particular requirements of the various positions. It is often necessary to secure, and pay for, many attributes in an individual which are seldom if ever utilized, in order to get the few actually needed. Functional organization goes far in remedying this difficulty. As Dr. Person asserts:

> If a function is clearly defined and understood, a normal person responsible for it will be able to learn to do it correctly, if such learning be within his natural capacity, or he will acknowledge inability to do it correctly and give way to one who is competent, for bluff cannot exist where there is perfect understanding. Technical efficiency results naturally from the understanding made possible by functional organization. If management discovers, defines and observes the functional organization inherent in the enterprise, much has been done to solve those managerial problems relating to technical efficiency.[24]

4. The specialization of personnel also makes it possible for each worker or official, if properly selected and placed, constantly to increase his knowledge and skill which are required for the performance of his particular task. A person concentrating his energies in a narrow field of activity can become an expert or a "past master" in his particular job. Functional organization, more than any other, makes it possible for all workers to receive expert knowledge concerning every phase of their work. "It conveys expert knowledge and guidance to each workman through experts, and not through foremen partially educated in the several fields. The separation of mental and manual labor is planned *with reference to the functions to be performed* and not as incidental to other phases of administration."[25]

5. Wherever skilled workers are required in the productive process the advantages of specialization are extremely great from the point of view of economy. As Taylor pointed

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[24] Harlow S. Person, "Major Problems of Management," in Henry C. Metcalf, *Scientific Foundations of Business Administration* (Baltimore: The Williams and Wilkins Company, 1926), p. 238.

[25] Dexter S. Kimball, *Principles of Industrial Organization* (3d ed.; New York: McGraw-Hill Book Company, Inc., 1925), p. 97.

out: "The full possibilities of functional foremanship, however, will not have been realized until almost all of the machines in the shop are run by men who are of smaller calibre and attainments, and who are therefore cheaper than those required under the old system."[26]

6. The functional type definitely divides and delineates authority and responsibility. As indicated above, the division of the work process can be made more easily into homogeneous control units, making it possible to describe more accurately the activities of the personnel in their performance. Thus, functions become more clearly defined. This applies to the duties and responsibilities of the jobs of both managing officials and ordinary workmen. It is this definiteness of the content and limits of job activities that makes definite, written, job instructions practicable or possible. Instruction cards, job specifications, and job manuals can then be relied upon to cover all phases of the work process without gaps or "overlaps" in activities. All this leads to another favorable feature of the functional type, namely, the measurement of results. "Strict definition of limited activities lends itself to stricter measurement of results accomplished and has a minimum of vagueness as to the content of any individual job and as to who may be responsible for any activity."[27]

7. With definite circumscription of authority and responsibility, and adequate measurement of effort required and results accomplished, the chief requisite for complete standardization of performance and operation is established. According to Dr. Person again:

> Functional organization involves standardization. That which is analyzed into its natural functional elements is a standard functional unity; it is a definite objective with definite technical means to accomplishment. The elements into which it is analyzed are standard functional elements of a functional whole. It is because the whole and the parts are standardized in their relation

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[26] F. W. Taylor, *Shop Management* (New York: Harper and Brothers, 1911), p. 105.

[27] Henry H. Farquhar, *op. cit.*, pp. 142-143.

> each to the other that functional organization promotes understanding of definite responsibilities.[28]

8. Functional organization, being so constituted, goes far toward doing away with the evils of one-man control. "It places definite emphasis on responsibility rather than on authority, since authority under this type of organization is definitely identified with knowledge as expressed through accomplishment. And since accomplishment may be fairly accurately measured, authority may be curtailed or extended accordingly."[29] Just how bossing is evaded is further described by Miss Follett:

> We have here, I think, one of the largest contributions of scientific management: it tends to depersonalize orders. From one point of view one might call the essence of scientific management the attempt to find the law of the situation. With scientific management the managers are as much under orders as the workers, for both obey the law of the situation. Our job is not how to get people to obey orders, but how to devise methods by which we can best *discover* the order integral to a particular situation. . . . If orders are simply part of the situation, the question of some one giving and some one receiving does not come up. . . .[30]

9. Functional organization with its many specialists, experts, and executives, all working side by side, each in his own circumscribed sphere of activities, and each with various contacts and relationships, tends to promote better acquaintanceship, fellowship, and usually cooperativeness within a group. This is especially true in this type because the emphasis is not upon rank and authority but upon duties and responsibilities; not upon personal arbitrariness, but upon clearly differentiated responsibilities, prescribed systems, and scientifically determined rules of action. As explained by Farquhar:

> There is established a freedom of horizontal contact between administrative officers to a greater degree than

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[28] Harlow S. Person, *op. cit.*, p. 241.

[29] Henry H. Farquhar, *op. cit.*, p. 143.

[30] M. P. Follett, "The Psychological Foundations: The Giving of Orders," in Henry C. Metcalf, *op. cit.*, p. 140.

is true with any other types of organization. Executives on the same plane of authority are constantly rubbing elbows with each other as one after another comes in contact with the same subordinates, each taking up his particular functional duties with these subordinates. This serves to break down departmental walls and tends to force team work. In case of disagreement—which of course occurs more often under functional organization than in other types, and which may become serious if functions are not carefully defined—appeal is taken to the next higher strata, resulting possibly in a further extension of horizontal along with vertical contacts.[31]

10. Finally, the functional principle is conducive to flexibility in organization structure. The diffusion of authority among men and managers all down the line makes it possible for the functional officials to iron out many emergency difficulties before they reach the attention of some major executive, or before he finds time to give the matter his attention. In addition to flexibility, the diffusion of executive authority also adds an element of permanency to an organization. The coming and going of various officials from time to time does not disrupt an organization to so great an extent as does the change of executives in whom is centered full authority. Under this type functions remain more or less constant. The various functionaries coming into the organization from time to time can be aided and assisted by fellow functionaries on all sides until they become accustomed to their new responsibilities. Moreover, these characteristics in organization structure make for growth, and that at a rapid rate if the proper groundwork for the system has been laid.

FUNCTIONAL DISADVANTAGES

1. A fundamental disadvantage of the functional type, from the practical standpoint, arises from the difficulty of properly installing the plan. This type depends for success upon the proper division of the work of the enterprise and the proper delineation of functions. It is no doubt easier to establish functional units for control purposes than to estab-

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[31] Henry H. Farquhar, *loc. cit.*

lish sections and departments under other types, but whether easy or not, this work must be done, and done accurately. Logical division of work into functions is apparently easy in theory, but practical difficulties often arise because of conditions surrounding the job or peculiarly affecting the worker. Not only must functions be properly established, but they must also be definitely delimited and described, which is sometimes difficult in the beginning when dealing with an intricate complex productive process. Moreover, accurately defined functions make written instructions a necessity, and written instructions are in turn dependent for effectiveness upon some degree of standardization. Although functional control is conducive to definiteness of instructions and to standardization, it is in turn dependent upon these for effective operation. Furthermore, standardization is dependent upon research, which of course takes both time and money. Thus, much study, planning, and expense are required to install the functional type, and unless it can be installed properly, a simpler plan might be preferable.

2. The same fundamental difficulty also results in disadvantages as to coordination. In the words of Dean Matherly:

> In functional organization effective coordination is difficult. It is exceedingly hard at times to define functional efforts. Where each activity shall be allocated and to whom it shall be assigned for execution is a problem of great magnitude. Unless relationships between functions are definitely determined and responsibility for every act definitely fixed, inefficiency is likely to result.[32]

Coordination is more difficult under this plan largely because of the fact that more coordination is provided in the structure of the organization and much more particularly in the lower executive ranks. Joint control of any kind is cumbersome and hard to operate without friction. Under this type there must be joint action or some coordination of individual actions wherever more than one function is involved in the execution of any task, and this, of course, cannot be obtained without preparation and cost.

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[32] Walter J. Matherly, *op. cit.*, p. 78.

3. A similar disadvantage of the functional type is sometimes encountered in maintaining discipline in the organization. According to Kimball:

> The greatest disadvantage of the system is that it tends to become unstable because of the weakening of disciplinary or line control unless proper means of coordinating the work of men and departments of the same authoritative level is provided. The success of the system, when carried out in large enterprises, rests largely on the ability of the managing authorities to correlate the work of strong personalities and have them work together harmoniously.[33]

There is danger to the morale of the workers owing to the apparent or sometimes actual contradiction of orders and instructions. The absence of strong line control for purposes of discipline and adjustment may have serious consequences especially in extraordinary or emergency situations. Although functional control tends to enhance teamwork and good will, at the same time it places greater reliance upon these factors; the great number of cross contacts and relationships greatly increases the possibility of friction arising somewhere. Since the old line boss is now displaced, this means that discipline must be otherwise provided for. Taylor, for instance, established the office of "disciplinarian" to prevent and to settle disciplinary problems. Moreover, scientific management definitely recognizes discipline as a problem of management under any type of organization and provides for its solution by personnel administration, by labor cooperation, and by effective leadership and morale building.

4. Just as the line type concentrates control too much, the functional type usually divides control too much, especially for effective, speedy operation. When labor is divided among the various functional officials it is a difficult problem to reunite the divided parts into a new and better synthesis and to locate and fix definite and complete responsibility. In practice, this phase of the process of organizing has often been poorly performed, which, it seems, has tended to discredit the whole plan. For example: "The functional plan

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[33] Dexter S. Kimball, *ibid.*

in some cases has worked out well and in others has proved a failure. The lack of a definite allocation of responsibility is one of its worst faults. With such overlapping of authority, it becomes difficult if not virtually impossible to place the blame correctly."[34]

This objection, which is quite often raised, is of course a corollary of the first-mentioned difficulty of properly installing the system. As stated, the whole plan depends upon a proper delineation and circumscription of functions and duties, which in turn depends upon scientific research. Moreover, the greater the degree of specialization and division of labor applied, the greater the necessity and the difficulty of the coordination or organization of labor. The functional plan which attempts to gain the advantages of an extreme division of labor is constantly confronted with problems of fitting together again the divided parts so that efficiency is obtained. Owing to the difficulties of such problems, the functional type often appears at a disadvantage in comparison with others which do not attempt so much.

5. Functional organization manifests a similar disadvantage in its great complexity of routine. To quote Matherly again:

> Functional organization is too complicated. There are too many lines of functional authority. The crisscrossing of functional controls leads to confusion. There are too many executive positions, too much clerical work, too much so-called red tape, too many bosses. In actual operation it is difficult for the workmen to know where one executive's work ends and another's begins.[35]

These charges are, however, as this author recognizes, "of doubtful validity." This is the objection most often raised by those who fail to comprehend the plan. The plan is, indeed, complex and intricate, and there is apparently much red tape. Red tape, however, has been defined as merely a "system not-understood." Thus, the practical disadvantages of the system lie in the difficulty of understanding it, a difficulty which must be overcome by the expense of employing a more intelligent and a better-trained personnel, and of maintaining machinery of some type for the purpose of instructing the personnel as to the nature and operation of the system.

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[34] Percival White, *Business Management: An Introduction to Business* (New York: Henry Holt and Company, 1926), p. 88.

[35] Walter J. Matherly, *ibid.*

6. In the functional system, accuracy is obtained quite often at the expense of speed.

> Although it must be true that there is still at the head of the undertaking one final source of authority and responsibility, nevertheless the functional method of assisting that one man to carry the burden does tend to slowing up of decisions and slowness of action in case of emergency. In functional organization speed is sacrificed to informal deliberation. This fact may have serious disadvantages or advantages, depending upon the kind of problems arising under particular circumstances. The fact remains, however, that this functional form is inherently slower in meeting emergencies than the straight-line form of organization.[36]

7. Another weakness of the functional type is that it does not develop good all-round executives. Each official specializes in his own narrow field. Frequently there is no one trained within the organization to take over administrative positions covering several or all functions. Moreover, the capacity for full control in executives is not developed. Their initiative is often crushed because of the lack of complete authority covering sufficient phases of the industrial process to complete a job. Thus, functional officials do not get experience in controlling with authority or with combinations of functions that would tend to develop the major executive and administrative officer. This may necessitate the institution of some plan of developing executive ability, such as the rotating of officers in certain executive positions—a system advocated also for staff officers.

8. Finally, it is claimed that the functional scheme is too expensive, that it requires too many officials and too much overhead. The scheme does require rather elaborate control machinery including research, systems, records, etc., and if these cannot be effectively utilized, it is expensive. However, if they are used effectively, the increase in overhead may be

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[36] Henry H. Farquhar, in The Taylor Society, *op. cit.*, p. 142.

more than counterbalanced by a decrease in direct expenses, serving thereby to reduce the total per-unit cost of production, as has been conclusively demonstrated by Taylor and his followers.

COMMITTEE USES AND ADVANTAGES

In discussing the relative merits of the committee as a type of organization it is not necessary to regard this type of control as being applied to all parts, phases, or functions throughout the entire organization. In fact, such a scheme is seldom if ever found in modern industry, although such a scheme could be readily imagined. However, as Dutton asserts: "In general, a group may be considered as interchangeable with an individual, for organizing purposes, although not necessarily of the same effectiveness."[37]

It should be recalled in this connection that official positions have been divided into three classes, namely: line positions, those having full authority; functional positions, those having limited or functional authority; and staff positions, those having only advisory power. Committees, it will be remembered, have been similarly divided into four main classes: (1) committees with full power, such as the administrative and the executive committees; (2) committees with limited power, such as the various functional committees with power to act but subject possibly to veto; (3) the advisory committee, which merely recommends; and (4) the class, the discussion group, etc. Committees of each of these respective classes are widely used, sometimes to supplant individuals but more often to supplement and assist individual officers. Wherever a committee supplants an individual it must of course have the power of that individual. Consequently committees have been classified in accordance with the classification of individual positions, except for the fourth class of committees which of course has no counterpart in the classification of individuals.

The effectiveness of the committee is widely recognized by its use as an administrative organ. In addition to the board of directors of every corporation there are executive committees of various functions and authority throughout the organization. According to Kimball: "In very large enterprises consisting, perhaps, of a number of plants widely separated geographically the committee system is a necessity in coordinating the activities of the several groups."[38] And, as he shows, these committees often have full authority. They may have veto power over a line executive, for instance:

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[37] Henry P. Dutton, *op. cit.*, p. 222.

> Not infrequently general managers are given full power to make expenditures for certain purposes up to a given amount, but are required to submit all proposals for greater expenditures to the advisory [*sic*] committee. In such a capacity the committee becomes an important controlling mechanism. The use of the committee principle thus to control or limit the component groups and to coordinate the several functions is quite common in very large enterprises.[39]

The use of the committee as a control agency is quite common throughout all levels in the control hierarchy of large and extensive industries. The question is quite logically asked: "If an advisory management council or executive board is good for the organization, it is always worth asking how far a smaller council or board would be good for any division or department."[40] Accordingly, Mr. Lamson in his description of a divisional organization emphasizes the importance of the divisional committee. He says:

> The divisional manager is the coördinating and correlating executive. He has the final responsibility for decisions. The Operating Committee serves as a cabinet and advisory body and offers an opportunity for direct personal contact and discussion between the departmental executives and the general manager, who acts as chairman of the meetings.[41]

In fact, according to some authors the committee is an absolute necessity in an organization of the line-staff or divisional type. According to others, "A functional organization cannot operate without committees, such committees being primarily of a co-ordinating nature"[42] Finally, the shop committee, composed of workers and executives, is found playing an important role in many enterprises, organized along strict line principles. The relative advantages and disadvantages of the committee in these various capacities, with their various functions and authority, and in conjunction with the other organization types, form the subject of the present study.

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[38] Dexter S. Kimball, *op. cit.*, p. 124.

[39] *Ibid.*, p. 125.

[40] Henry S. Dennison, *Organization Engineering* (New York: McGraw-Hill Book Company, Inc., 1931), p. 142.

[41] Fredrick L. Lamson, "General Administrative Organization and Control," in G. T. Schwenning (ed.), *Management Problems* (Chapel Hill: University of North Carolina Press, 1930), p. 247.

Since there seems to be considerable difference of opinion concerning the relative advantages of the committee in industrial organization, a twofold classification of such advantages may prove helpful. The first classification may then contain the more or less inherent advantages and the peculiar situations in organization control in which the committee could render a service that might not be so well rendered by any other feature of the structure. The second classification may then be devoted to an enumeration of functions which a committee may well perform in strengthening organization structure.

Under the first classification of advantages may be included, first, Rubey's summary of situations in which committees may be used to advantage. These are:

> 1. Among men of the same caliber or authority, among whom the majority vote will generally be accepted without question and with whom many excellent ideas and combinations of ideas originate. One man will make a suggestion and another will modify this; in a short time some practical and mutually satisfactory plan will have been evolved. Again, a man is ashamed to air his petty grievances and jealousy before a committee and will accept a reasonable plan which would not be acceptable to him if he could make his decision in some less conspicuous place.
>
> 2. Among men of the same caliber or authority, but heading different departments or branches of a business. Here each man presents the points of view and aims of his department and secures the coöperation of the others.

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[42] Oliver Sheldon, *op. cit.*, p. 128.

> Without such meetings each department head is likely to develop his department at the expense of the organization as a whole.
>
> 3. Among men of different caliber or authority to iron out class differences and points of view. The more numerous class, that of the laborers, usually chooses representatives. The personal contact creates tolerance between the classes, and there is less of the distrust and misunderstanding which exist between strangers. . . .
>
> 4. Among men of the same or different caliber or authority for the purpose of common counsel and for creating interest and enthusiasm.[43]

Much the same idea is advanced by Dean Kimball in what he calls the inherent advantages in a good committee.

> First it is impersonal in its action, and its verdict, like that of any jury, is usually based on the *facts* presented [*sic*]. The very atmosphere of a committee tends to compel all of its members to lay aside pettiness and personal prejudice and to act in accordance with the merits of the case. The foreman who would, over the telephone, blame a fellow foreman for a delay will hesitate to do so in his presence or in that of his superior officers. The decisions of a committee are, therefore, likely to be more accurate than those of an individual because of the greater accuracy of its basic information. A misstatement on the part of a member is not likely to go unchallenged.
>
> Secondly, committee meetings tend to promote a better understanding between men of the same authoritative level and of different levels. Distrust and jealousy of each other are rapidly eliminated as men know one another better and see the good side of each other's nature. There is something likable in all men if one can succeed in discovering it, and this can be done only by bringing them into close personal contact with common problems to be solved, not by wrangling and fault finding but by an earnest endeavor to find the very best solution. Thirdly, the committee method tends to awaken interest in the work and to draw out the best efforts of all of its members, and tends generally toward a better *esprit de corps*.[44]

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[43] Harry Rubey, *Industrial Organization* (Boston: Ginn and Company, 1931), p. 65.

[44] Dexter S. Kimball, *op. cit.*, pp. 121-122.

Under the second classification of advantages of the committee an attempt may be made to point out and describe the several capacities in which a committee may serve to strengthen organization structure. Of the many writers on the subject, some find the committee most useful in performing certain functions, and other writers, whether agreeing or not with the first, find the committee particularly serviceable in a different capacity. Still others deprecate the use of the committee in any capacity. Committee advantages and disadvantages must represent, therefore, many points of view.

1. A first contribution of the committee to the structure of an organization may be designated as that of cooperation. In the summary quoted from Kimball, the second and third advantages relate chiefly to the influence of the committee meeting upon its members. This influence brings results to the organization through what is usually termed cooperation or morale. The committee idea represents democracy in management, and democracy itself wherever it exists can supply a certain spirit to a body not usually obtainable otherwise. Thus: "The Committee Idea recognizes the human factor, fosters the spirit of co-operation, implants the new ideas of organization and its fundamentals in the minds of all members of the organization, and gives everyone the necessary contact properly to perform his tasks."[45]

2. A second contribution of the committee may be termed coordination. Dutton inquires as follows: "Going further, why should the executive coordinate and patch together decisions made separately by independent departments? Why not bring the subordinates together in informal but obligatory conferences, so that each is kept informed of the conditions outside his department which must affect his decisions?"[46] The coordination secured through committees is also emphasized by Anderson:

> In a business of any size, committees provide the chief instrument for producing teamwork and coordination of viewpoint. The larger the organization the more essential

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[45] Richard H. Lansburgh, *Industrial Management* (2d ed.; New York: John Wiley and Sons, Inc., 1928), p. 56.

[46] Henry P. Dutton, *op. cit.*, pp. 158-159.

> they are to unity of action. All committees are in a sense coordinative in that they disseminate a common understanding among the personnel, promote harmony and lead to balanced effort with one definite purpose in mind.[47]

Thus, committees are by their very nature coordinative since they bring together individuals to engage in common problems.

3. A third possibility of the committee might be styled permanence, stability, or continuity of policy. Dicksee emphasizes this characteristic. In discussing the relative merits of committee control, he says:

> It provides very much more effectively for continuity of policy than is possible under the rule of any individual. The supreme control of all matters by one individual—who, to be successful at all, must be exceptionally able—tends probably rather in the direction of dwarfing the faculties of his immediate subordinates, with the result that at the times when he is away (and of course no individual can invariably be on the spot whenever wanted), the absence of this power, upon whomever everyone is accustomed to lean, is very likely to be felt with disadvantageous results; whereas, with a Board of Directors, one can at least ensure the presence of somebody having the requisite power to act being always on the spot.[48]

4. A committee function emphasized by nearly all writers on the subject is that of rendering collective advice to the executive officers. According to White: "The best use to which the committee can be put is in a consulting capacity. An office manager, for instance, may do well to call meetings of his division heads, for the purpose of obtaining a combined judgment on some proposed course of action."[49]

The usefulness of a committee for such a purpose is apparent. It is based on the axiom that "two heads are better than one." This is especially true when the members are selected from various fields of activity and experience, yet are conversant with the problems to be solved by the action of the committee. Even though the decision of the committee should not be acceptable, the discussion of the question by men of various points of view is often of great value to the executives or deciding authorities if they be present.

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[47] Arthur G. Anderson, *Industrial Engineering and Factory Management* (New York: The Ronald Press Company, copyright 1928), p. 46.

[48] Lawrence R. Dicksee, *Business Organization* (London: Longmans, Green and Company, 1919), p. 50.

[49] Percival White, *op. cit.*, p. 91.

5. The committee as an educational device is also emphasized by nearly all students of the subject.

> The development or discovery of leaders among younger members of an organization, to replace older executives as they retire, is now recognized as a problem. The tendency of functional organization to promote self-development and self-expression should be enhanced in value by utilizing committees as a training ground for the participants. Modern psychology has discovered the significance of differences in individual capacity and the extent of these differences; and one of the problems of management is likewise to devise means of discovering these differences. Research capacity and capacity to execute decisions are not so difficult to discover and develop; but the capacity to make sound judgments—perspective, logical acumen, common sense—are not easily discovered and developed. As an instrument for the discovery and development of such capacities the committee has a high value.[50]

6. Finally, committees may be used effectively for many special functions. They may serve as juries to hear disputes and complaints. They may make investigations and submit reports. They are often useful in drawing up rules and regulations covering widely scattered aspects of a business. Committees may often work out plans and general policies, or they may hear proposals or suggestions from individuals and make replies. They are also useful in emergencies or in coping with some new situation when there is no one individual who is exactly qualified for the task. Also, committees are especially advantageous in handling matters common to several or all departments, as for example production programs, budgets, and welfare activities. If properly con-

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[50] Henry H. Farquhar, *op. cit.*, p. 144.

stituted and properly conducted the committee may be a valuable structural device in any organization.

COMMITTEE DISADVANTAGES

In discussing the disadvantages of the committee it is necessary to consider only the committee as a control device in organization structure. A committee with no authority, with no power to decide, or without responsibility for the performance of some essential function could do little serious harm even though its shortcomings were many. Such a committee, however, when used along with some other type of control may prove to be a valuable auxiliary to management and administration. It is the committee with some degree of decision-making power that should be considered, and the faults and disadvantages of which should be compared.

1. The chief weakness of the committee as a structural member in organization control is its characteristic of divided responsibility. Many agree that "genuine committee management invariably involves lack of initiative, division of responsibility, and log-rolling."[51] This disadvantage is also stressed by John H. Williams as follows:

> By "the lodging of final authority in committees or in individuals," I have in mind the difference between joint and individual responsibility. With the committee form of organization, responsibilities are divided and what is the duty of more than one person is no one's duty. Advisory committees are sometimes helpful in developing various alternative possibilities, but there is always the great danger that they will be used to elude individual responsibility. There is another undesirable factor with reference to committee decisions. Most men will accede and respond to a decision rendered by the person responsible for the decision, but there is an instinctive distaste for accepting impersonal decisions.[52]

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[51] Morris L. Cooke, "Academic and Industrial Efficiency," *Bulletin No. 5, Carnegie Foundation for the Advancement of Teaching,* New York, 1910, p. 14.

[52] John H. Williams, "Policies and Methods of the Chief Executive," in Daniel Bloomfield (ed.), *The Modern Executive* (New York: The H. W. Wilson Company, 1924), p. 73. Used by permission of the publishers.

2. Another fault of the committee is the element of compromise in its decisions. Along with divided responsibility there is almost inevitably a lack of positiveness in committee decisions. "Committee management generally means compromise reached by discussions, and compromises frequently leave something to be thrashed over at a later date."[53] William R. Bassett is even more emphatic when he says:

> These several things we do know: The one-man type is not preserved in the committee or board of managers style of administration. In this plan the heads all meet and decide the policies among them. The result is that instead of individual responsibility we have group responsibility and inevitably the kind of action which is known as "playing safe." . . . Hence we obtain not the best that is in the men, but just the general average on which there can be an agreement.[54]

3. A rather serious practical disadvantage of the committee is that it wastes the time of its members. In the first place the committee, if its decisions are to be the result of collective deliberation and agreement, is slow in reaching its conclusions. It is therefore unsuited for quick decisions, wherever these are necessary.[55] In the second place the committee is time consuming because it takes the time of many valuable men who might be more efficiently employed at their own particular functions. This fault is well described by Dr. Cooke:

> Almost invariably under committee management there is the spectacle of three or more men, experts in their own specialties, all simultaneously wasting precious time in deciding questions outside of their own field, which could be better and far more quickly decided by a single expert whose time may be worth less than that of any one of the three or six men on the committee. Modern industrial management seeks to relieve the head men of all possible routine such as is the great bulk of committee work, and so enables them to give their entire time to progress. At

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[53] Morris L. Cooke, *loc. cit.*

[54] From *The Organization of Modern Business* (1921), pp. 171-172, by William R. Bassett. Used by permission of the publishers, Dodd, Mead & Company.

[55] See John H. Williams, *loc. cit.*

> the same time these heads are kept constantly informed, through carefully prepared and summarized reports, as to all matters affecting the institution or its departments.[56]

4. There is at least one function in organization management which, in the unanimous opinion of all authorities, the committee is unsuited to perform. This is the function of execution. As quoted by Cooke: "The world's experience in all directions has demonstrated the utter impracticability of doing successfully executive work under the management of a body of men either large or small. An executive committee of *one* is the best committee to have in charge of executive work."[57]

A committee should never attempt to take the place of an executive officer in the performance of his proper duties. It should not attempt to carry out either its own orders or those of a higher body. It may advise as to execution, or it may supervise and correlate the activities of its executive officers. Its proper function in connection with execution is to render definite and concise decisions which may decide an issue or serve as an order for execution, an order which assigns a mission or objective but does not undertake to give in detail the steps and the specific methods to be followed in its execution.

5. Finally, the committee, it is said, may often be merely a poor substitute for proper organization in the first place. Although the committee may be used to advantage in various capacities, yet it may not be the best of all possible devices. Committees may take the place of a specialized staff or they may make a staff more effective. They are often used to bolster up morale when a poor management or personnel policy make much bolstering necessary. The same is often true when they are advocated for coordination. Says Sheldon:

> There is a healthy and inevitable demand in industry for co-ordination. We need to remember, however, that co-ordination can be obtained in more than one way. To co-ordinate does not necessarily mean that a committee

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[56] Morris L. Cooke, *op. cit.*, pp. 13-14.

[57] F. W. Taylor, in a lecture before the Harvard School of Business Administration, *ibid.*, p. 16.

> must be established. Co-ordination by committees is only necessary where the subjects to be co-ordinated are constantly variable, and discussion is essential. Where those subjects can be rendered wholly or in a large measure standard, co-ordination is better obtained by establishing machinery whereby it may be rendered almost automatic. . . . Indeed, it is not wide of the mark to say that the present tendency in industry to multiply committees and conferences is, in some large degree, due to the lack of proper executive machinery.[58]

Thus, it may be observed, there is a rather fundamental difference of opinion as to the utility or the relative merits of a committee, even when it only supplements individual officials in an organization. Business executives, for the most part, seem to have a confirmed distaste for committees of any kind. They point to the costliness of the committee in consuming the time of men who must be thus absent from their individual work. The informal conference of some three or four persons is the nearest approach to a committee that meets with their approval.

The founders of scientific management also object to the committee, except, of course, as a necessary institution of democracy, as a means of making personal contacts, disseminating information, or other social or political purposes. They prefer to divide up the activities and duties required of an organization so that a specialist may be placed in full control of each activity and made individually responsible for the duties assigned to him. The superior executive serves then not as a chairman of a collective body but as an individual coordinator of the work of the various specialists. In accordance with this view a committee meeting, except on account of an emergency of some kind, is a reflection upon the structure of the organization, or upon the ability of the administration to divide and distribute properly to competent persons the various functions to be performed and to coordinate and synthesize their individual accomplishments. There is no denial that large-scale and complex organizations are most effectively administered through joint control, but, it will be remembered,[59] joint control is effectuated through both the committee and the functional type of organization. Of these two the functional type is more often preferred, the committee being resorted to for control purposes as seldom as possible. On the contrary, a large number of authorities heartily recommend the use of committees throughout the structure of an organization.

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[58] Oliver Sheldon, *op. cit.*, p. 223.

Upon completing an enumeration of the advantages and disadvantages of the several types the conventional practice is to present in summary form the conclusions as to which type is most advantageous and which is most disadvantageous. This method, as previously indicated, is misleading, for there is no one best or worst type. The proper service of a discussion of advantages and disadvantages is to draw attention to certain features in each type which may indicate the proper use and fitness of that type, and to point out in each type certain features which may prove undesirable for the purpose at hand and corrections for which may have to be made before the particular type would prove successful. Thus, rather than to generalize further concerning the relative merits of each type, a better procedure would, it seems, consist in first describing certain general situations or conditions which each point toward a particular type as being most desirable, and second to present general principles governing the building of organization structures. These will accordingly constitute the main problems of the next chapter.

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[59] *Vide supra,* Chap. V, *s.v.* The Functional Type.

CHAPTER VII

ORGANIZATION PRINCIPLES AND LAWS

In discussing the relative merits of the various organization types it was indicated that there may be certain situations which practically demand a particular structural type. It was also indicated that in many other situations there was a choice of types. The question then of what determines the particular type or types in each case naturally arises. To review all possible situations and to select a type suitable for each would, of course, be a problem of too great magnitude for present limits. However, a few guiding principles are discernible among the mass of details, and consequently it is possible to describe certain general conditions and situations that suggest each a certain type, or, perhaps, a choice of not more than two types. Such a study by its very nature must deal with generalities, because no type should ever be adopted until an exhaustive study of all factors entering each particular situation has been made.

The complexities of this problem are well summarized by Lansburgh as follows:

> Regard for the aim of the enterprise is most important at the time that the first steps are taken in the building or development of the structure which is to be termed the organization of that enterprise. In no two businesses are the purposes of the management or the conditions of operation entirely alike. It will be easiest to consider this fundamental of organization by considering businesses of diverse natures wherein it can be seen that the organization structure must necessarily be different in order to meet the several conditions involved. Let us consider the organization which is necessary to take care of the unusual occurrence wherein speed of attainment and not cost is the dominating factor. Such an instance is clearing of a railroad right-of-way after a wreck. All thought of cost is thrown aside and an organization is constructed which, by main force, will have but one end in view, namely,

> clearing the tracks and letting through the trains at the earliest possible moment. Compare this to the organization which is necessary for the operation of a huge manufacturing plant which is to remain in existence for many years, whose activities are not only numerous but varied and must all be carried on with due relation to each other. It will be seen readily that the organization structure required in the case of the railroad wreck will be far more simple, far more direct, than will the structure which is required to carry on the work of the great manufacturing establishment.[1]

Thus, the factors entering into the determination of types are both numerous and varied, but such factors as these and no doubt others must be fully considered before the structure of an organization is finally determined.

As a word of caution, in discussing the merits and the determinants of the various types, one essential should not be overlooked. This is the importance of organizing soundly and scientifically according to any type. As Robb has indicated, organizations must be adapted to the purpose at hand, and the structural type selected must be the one that serves the particular purpose best. This is true, but in considering particular purposes and conditions care must be taken not to lose sight of the general purposes that should be served by all types. This is merely to say that one should not become so involved in the problem of determining the type for particular purposes that he is forgetful of the general purposes that should also be served by the structure. After all, it is perhaps rare that one purpose is all-important or so dominant that it alone should be served to the complete exclusion of all others. It is for this reason that the factors such as size, localization, or technology of the industry do not each produce organizations of the same type. Each factor is important, but, in organizing, all factors must be considered jointly. Thus, for example, it is impossible to say that all department stores or even all large-scale shoe manufacturing enterprises should each adopt identical structural types.

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[1] Richard H. Lansburgh, *Industrial Management* (2nd ed.; New York: John Wiley and Sons, Inc., 1928), pp. 33-34. For a further discussion of this point see Russell Robb, "There Is No Single Correct Form of Organization," in Leon C. Marshall, *Business Administration*, pp. 778-779.

Before proceeding to enumerate and discuss the determinants of the structural types of control in organization it is necessary to call attention again to the several types themselves. Under each of the four main types, it will be remembered, there were identified several variations, or subtypes.[2] In the following discussion it seems possible to take some note of the most important of these subtypes. Thus, under the line type there were noted the pure line and the departmental forms. The departmental form differs from the pure line only in that the former contains a division of labor as between groups or departments. Under the line-staff type the divisional form was differentiated from the simple line-staff form. In the divisional form the staff officers are under the authority of divisional or departmental officers but advised by specialists in their same fields or functions at general headquarters. Subtypes under the functional and the committee types were not clearly distinguished since they differed from one another chiefly in the degree to which the respective principles were applied throughout all ranks, functions, and divisions of the organization. It should be remembered also that the order of presentation of types represented a progression from the more simple to the more complex. There may be noted in this order, therefore, the following types: (1) line or pure line, (2) departmental, (3) line-staff or pure line-staff, (4) divisional, (5) functional, and (6) committee.

DETERMINANTS OF STRUCTURAL TYPES

1. The most evident factor determining the type of organization is possibly that of size.

> In a small firm it is usually not possible to have a clear-cut division of activities such as we have discussed in this text. The activities of each group are not of sufficient volume or importance to make it profitable to employ an executive to administer them. In many cases one executive is responsible for two or more groups of activities. In fact, in some cases we have a one-man organization

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[2] *Vide supra,* Chap. V.

> where the owner is responsible for all the activities of the business. He has jurisdiction of sales, purchases, finance, personnel and records. For example, the owner of a small grocery store may not only have jurisdiction of, but may actually perform, all the activities necessary for its operation.[8]

In other words, the smaller the organization, or the fewer the persons to be brought into a group the less need there is for elaborate organization structure. The fewer to be controlled, the fewer to be coordinated, the fewer to be disciplined, instructed, or advised, and the less the specialization of personnel, the less need there is for a complex structure. Thus, it may be said, the smaller the organization the simpler its structure is likely to be.

2. The factor of time may affect the selection of a type in several ways. In the first place, the matter of multiple shifts may cause complications in structure. Frequently where several shifts are employed there is a complete line organization for each shift, or, in other words, the line organization is in duplicate or triplicate, depending upon the number of shifts used. These line units contain a minimum of higher executives and staff or functional officers, who, if they need to come in direct contact with the men on each shift, arrange their hours so as to be with each shift a part of their time. This may be done by staggering their hours with those of the various shifts, by dividing their work day into two periods, or by visiting each shift only on alternate periods. The line-staff type is well adapted to such conditions.

A second way in which time may be of importance in the selection of a type is that of duration, or the expected length of life, of the organization. Temporary organizations should be as simple as possible. Instead of a highly trained staff it would be better to employ professional experts, even at a high fee. It requires time to develop and coordinate an expert staff or to establish a smooth-working, functional structure because of the necessity of the research and standardization which should precede its introduction. A simple line or departmental structure assisted by outside services and professional experts will usually prove cheaper for temporary enterprises.

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[8] James O. McKinsey, *Business Administration* (Cincinnati: South-Western Publishing Company, 1924), p. 278.

Along with duration may be mentioned also speed, or emergency action, as a factor in determining types. Here, again, the simple line or departmental type is usually preferred. The merits of line control is recognized in the Army, as Marshall and Wiese have pointed out.

> The whole organization, therefore, must be formulated in such a way as to be tremendously effective in emergency situations. This is one reason why military organization is ordinarily severe organization in which there is great emphasis upon discipline, obedience, and definiteness of action when commands are given. Authority and responsibility taper down from the commanding general to the lowliest private in the rear ranks. Everyone in authority is trained instantly to assume all the duties of the man above him. . . .[4]

3. Another important determinant of types is space, localization, or territorial distribution.

> If a business has its organization territorially distributed its administrative problem is more difficult. It is harder to exercise supervision over the activities of the different members of the organization and it is harder to bring about coordination of effort. Consequently the organization in the central office will need to be different in the two cases. For each department which has territorial units there should be an executive head with an appropriate staff at the general office. It will be the object of this executive and his staff to direct, guide, coordinate, and control the various units of the organization over which they have jurisdiction.[5]

The divisional type is particularly suited for controlling a widely scattered enterprise whenever anything more than a pure line type is needed.

4. Perhaps the most important factor of all which may determine the selection of an organization type is the na-

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[4] From Leon C. Marshall and Mildred J. Wiese, *Modern Business* (1926), p. 486. By permission of The Macmillan Company, publishers.

[5] James O. McKinsey, *op. cit.*, p. 282.

ture and the degree of division of labor applicable to the particular productive process. As a rule, if little specialization is required in the work an organization has to do, a simple structural type will prove most efficient, and conversely, if the nature of the work requires a high degree of specialization, one of the more complex types will prove best. "In a manufacturing business, if the product be standard, ordinarily the organization will need to be differently constructed than if the product were diversified. The same amount of business may be handled with fewer chief executives if the product be standard, because it is easier to delegate authority in such businesses."[6] This is true not only of industries manufacturing a standard product, but also of those confining their activities to one operation, process, or function in production or distribution. This usually applies also to industries of the continuous process type. In industries containing these characteristics the department type is most often found. Even when there are several processes or functions performed or products made the same type may serve well if it is possible to place each process, function, or product entirely under the supervision of a separate and distinct department. Many rather extensive enterprises are organized in this manner.

However, if an industry with these characteristics requires much coordination, inspection, research, planning, technological knowledge, or special service as auxiliary to the main work process a line-staff structure is advisable. If the work is also widely scattered the divisional type is usually recommended.

Highly integrated industries are usually served best by a complex structural type. The functional type is particularly suited wherever a high degree of skill of widely different kinds is required of the workmen and officials throughout all stages of production, or wherever the various operations, processes, and functions are inextricably related to one another and to the whole productive system. The committee type finds, perhaps, its greatest usefulness in industry wherever much highly specialized knowledge from widely differing fields of learning must be coordinated and adapted for production purposes. The committee is also useful in conjunction with the functional type to bring together widely scattered functional officers for conference and coordination.

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[6] Richard H. Lansburgh, *op. cit.*, p. 33.

5. A factor of the greatest practical importance in determining types of organization as they actually exist is that of personnel. "The student of administration will frequently find organizations which are not based on a logical classification of activities. In most cases an investigation will show that the personnel of the organization has been a major factor in determining the form of organization."[7] Personnel may influence the selection of types in several ways. In the first place, men of a lower range of intelligence and with a low personality equation are usually controlled better by a simple type, while men of high intelligence, broad training, and agreeable personalities adapt themselves better to the more complex types.[8] The functional and committee types require of the members a high degree of initiative and cooperativeness, and they are better adapted to persons of these characteristics. The line types, on the contrary, require chiefly obedience, orderliness, and sometimes a personality that can fawn before the executive officers. Before selecting a structural type, therefore, it is essential to know what kind of personnel is available.

In the second place, highly specialized personnel may not be available at a fair price. Rather than employ an expert staff at high salaries, it may be more economical to hire the services of professional, trade, educational, or governmental organizations. Moreover, in setting up functional positions it is always necessary to take into consideration the particular way in which persons specialize their training. For example, a lawyer and a dentist may be found anywhere, but to find two men each half lawyer and half dentist would be very difficult, no doubt.

In addition to psychology and training of the personnel, custom and habit may be an important determinant of type. This is particularly true wherever there is an old organization already in existence. According to Mr. Lansburgh again:

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[7] James O. McKinsey, *op. cit.*, p. 281.

[8] See Harry Rubey, *Industrial Organization* (Boston: Ginn and Company, 1931), p. 61.

> The fourth of the primary fundamentals of organization is regard for the personal equation. By regard for the personal equation is meant consideration of the abilities and limitations of men and women.
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> In developing lines of supervision and in fixing responsibility, it is not possible to consider only the factors of the business which would ordinarily demand that decisions of a certain nature be made. It is necessary to take into account the personnel which is available, or which can be made available. Arranging an organization should be looked upon more as a game like chess and less as a game like checkers. Frequently men have been moved across the board of the industrial game as if they were all of equal value, as if one could readily replace the other, as if one could always fit into an organization niche when another had gone, merely because he was a man of approximately the same salary or had previously performed approximately the same duties. Men are of different values and work together in different ways. They fit into the team-play in various ways. Men are not square pegs or round pegs to be fitted into square holes or round holes, as is frequently said. The concept that a job is of a particular kind and that it is necessary to find a man to fit that job is frequently wrong.[9]

6. Finally, and of fundamental importance as a factor determining the type of control for the various workers and groups of workers in an organization, is the technology of the particular productive process. As indicated previously,[10] it is the technology of the industry that determines what functions are to be performed and the work relationships between functions. Furthermore, it is the particular organization of the work and the nature of the systems employed that determine the primary groupings of workers and the work relationships of each group with another. It is upon this organization of the productive process that the organization of the personnel for purposes of control is superimposed. Thus, technology determines the nature, the sys-

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[9] Richard H. Lansburgh, *op. cit.*, pp. 36-37.

[10] *Vide supra*, Chap. III.

tem, and the layout of the work which, in turn, have a vital influence in the determination of structural types.

Generalizations as to the type most suitable for facilitating certain technological conditions or certain types of industries are extremely precarious, however, and, it may be observed, such generalizations are seldom attempted by students who have studied many technological processes, many functions, or many industries. Since some students and business men often place too much emphasis upon the factor of technology alone, certain limitations should be pointed out. In the first place, the technology of the work or of the industry is only one factor. The equipment and the facilities for performing the necessary work, and the conditions under which it must be performed, are also vitally important. In the second place, the problem of controlling the personnel is largely a psychological or a sociological problem, or more specifically a labor problem. It is often desired that workers be made subservient to technology, even for their own ultimate good; nevertheless, engineers and technicians are often baffled in the perfect operation of their systems by the apparent incorrigibility of the personnel. It is necessary to understand, therefore, that in controlling the activities of human beings particular technologies must often stand in abeyance to general principles of personnel administration and labor relations and behavior.

With these limitations extant, several generalizations as to technology may be offered. First, the functional type, it will be recalled, was first developed by Taylor in a job-order shop, and such industries still make great use of that type. Second, long belt conveyor assemblies seem to be making good use of the functional principle, although there is apparently some disposition to divide the assembly line into segments and establish departments for each segment. Third, wherever operations or processes are sharply differentiated each such operation or process is organized to constitute a department employing line control. Thus, spinning, weaving, finishing, etc., are performed usually in separate and distinct departments. It may be noted also that salesmen, agencies, and dealers are often controlled in accordance with the functional principle. Thus, each local representative or employee is visited by various experts such as auditors, specialty men, advertising or publicity experts, etc., each having authority to give orders and instructions pertaining to his own respective function. Committee control seems to have its greatest application in educational institutions, and in the functions or divisions of business enterprises having to do chiefly with knowledge, or such activities as research, planning, and instruction. Committees are, of course, widely used in societies, associations, cooperatives, and the like in order to effectuate democratic control.

In conclusion, it should be again asserted that the factors which enter into the determination of the proper type of control are both numerous and varied, and that after all it is not usually a particular factor but a particular combination of factors that in practice constitutes the ultimate determinant of a particular organization structure. The purpose of an enumeration of individual determining factors is merely to point out factors that must be considered before attempting to apply a particular structural principle to an actual situation, that is, the several determining factors, not the ultimate determinant.

ORGANIZATION PRINCIPLES

Organization literature abounds in principles, laws, and statements of fundamentals and essentials. Among most of these there is close agreement as between the various authors who state them, and upon analysis these various statements may be summarized and "boiled down" to a few general headings. Accordingly, these summarized statements may be designated as the principles of organization; and the statements concerning the application of these principles may be known as laws or rules. The principle may be regarded as containing the germ idea which may be exemplified in various ways, and expressed in various forms as laws. The majority of the laws of organization are based upon one or more of these several principles. Other laws, however, are not so closely connected with any particular basic principle; they resemble more closely working rules or practices developed from experience in organization construction. And, of course, there may be many border-line cases between these two respective categories.

DIVISION OF LABOR

The most fundamental principle underlying all organization of every kind is no doubt the principle of division of labor. This principle since it was first emphasized by Adam Smith has been recognized as basic to all kinds of collective effort. Its application to geographical specialization, and to product and industrial specialization, is well understood and duly emphasized. Its application to the science of organization must be understood also, for it is the basic idea underlying many of the so-called axioms, essentials, rules, laws, and principles of organization. In one form it becomes the principle of comparative advantage, and it is explained as follows: "Each person tends to do that work in which his ratio of advantage is greatest as compared with other persons, or his ratio of disadvantage is least, up to the point when his services are needed for work which he does less well, in order to meet the demand for this work at the prices that will come to prevail under such circumstances."[11] In another form it appears as the law of functional management or functional foremanship: *"As the scope of an executive's responsibility is narrowed his efficiency increases."*[12] Thus the principle is manifested in various forms and applied throughout all phases of organization wherever specialization of machines, men, or management is encountered.

Division of labor as applied to organization may be considered from two points of view. From the first, it is the work an organization has to do that is analyzed and divided into its simplest elements. From the second point of view, the efforts and activities of the workers and managers must receive the chief emphasis in the process of division and analysis. These two points of view are not always clearly distinguishable, for they are indeed merely different aspects of the problem of organization as a whole.

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[11] John D. Black, *Introduction to Production Economics* (New York: Henry Holt and Company, 1926), p. 137.

[12] L. P. Alford, *Laws of Management Applied to Manufacturing* (New York: The Ronald Press Company, copyright 1928), p. 82.

By dividing every operation, performance, or step in the body of work an organization has to do into its simplest or most elementary units several economies are made possible. First, a thorough analysis leads to a thorough understanding, and by thoroughly understanding work many improvements are made possible and encouraged. These improvements may be made in the elimination of useless steps and elements or in the rearrangement of the essential steps into a work system which accomplishes the same purpose in a more direct or economical manner. Second, the division of an intricate operation or work process into very simple elemental units makes possible the performance of much of this work by semi-automatic and automatic machines. It may be said, therefore, that division of labor or work precedes and enhances the application of the principles of transfer of skill and thought, principles which are fundamental to modern industrial progress.[13]

The second phase of the division of labor, the division and analysis of the activities, the jobs, and the functions of the personnel, is well recognized in business and in management literature. This phase in its narrower aspects is the equivalent of Taylor's first principle of scientific management, which he describes as the development of "a science for each element of a man's work, which replaces the old rule-of-thumb method."[14] It is also the starting point in time study, motion study, job analysis, and, as a matter of fact, in all organization study.

The principle of division of labor applied to the workers and managers is in its larger aspects usually designated as the principle of personnel specialization. It consists in dividing up the work of a complex and highly skilled activity or function into a series of relatively simple jobs. The advantages accruing from such a division have been well known and duly emphasized since the days of John Stuart Mill.[15] The principle is stated today in many forms and with many applications. It is stated by Alford in one form as the law of division of effort, or specialization of the individual: *"Assigning to each worker one or a very few manual or mental operations which he is particularly adapted to perform improves the quality and increases the quantity of output."*[16] Alford states it in another form as the law of division of work or specialization of the job: "Subdividing work so that one or a very few manual or mental operations can be assigned to a worker improves the quality and increases the quantity of output."[17] It is also basic to his law of individual productivity: "The highest individual productivity is possible only when the worker is given the highest class of work for which his natural abilities fit him."[18] The application of personnel specialization to the work of management is usually termed functionalization or functional foremanship and stated, as quoted above, as a law. Another application of this principle is found in the exception principle, according to which, ". . . all matters within the capacity of subordinate officials are finally determined by them and only such matters as are beyond their scope or authority are passed up the line, thus leaving the higher officials free to devote their time to the broadest and most important problems of administration."[19] There is thus practically no end to the corollaries and derivatives of the principle of division of labor. It manifests itself in various laws of organization and management.

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[13] See Dexter S. Kimball, *Principles of Industrial Organization* (3d ed.; New York: McGraw-Hill Book Company, Inc., 1925), pp. 12-13.

[14] F. W. Taylor, *The Principles of Scientific Management* (New York: Harper and Brothers, 1911), p. 36.

[15] See William H. Kiekhofer, *Economic Principles, Problems and Policies* (New York: D. Appleton-Century Company, 1936), p. 40.

COMBINATION OF LABOR

The second great principle, basic to the science of organization, is what may be here called the principle of combination of labor, coordination of labor, or organization of labor. This principle as such has not received particular emphasis in the literature of production and industrial economics as a whole. As Florence, however, aptly remarks:

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[16] L. P. Alford, *op. cit.*, p. 82.

[17] *Ibid.*

[18] Frank L. Eidmann, *Economic Control of Engineering and Manufacturing* (New York: McGraw-Hill Book Company, Inc., 1931), p. 7.

[19] Bertrand C. Thompson, *The Theory and Practice of Scientific Management* (Boston: Houghton Mifflin Company, 1917), p. 48.

> So much has been written in praise of specialization and division of labor since Adam Smith, that this necessity for a "re-co-ordinating" the parts divided up must always be emphasized. If A makes the head of the pin, and B the shaft, someone has got to see that the heads and shafts are produced in equal numbers by a given date and at a given place. The common factor of administration or management in its wider and narrower meaning is, in fact, this very counterweight to specialization.[20]

Although this problem apparently did not loom as of major concern in the past it is of growing importance at present. With the extreme division and specialization of labor that is characteristic of modern industry it often becomes a limiting factor to further progress.

It may be argued, however, that this principle is included in the broad principle of division of labor and that it is merely the last phase of that principle, the first and second phases being, respectively, analysis and specialization. Kimball emphasizes its close association and its importance as follows:

> It is almost axiomatic that division of labor with or without the use of specialized machinery must be accompanied by some form of *co-ordinative influence* to secure definite results. It is not sufficient that each worker do his part well, but his efforts must be co-ordinated with those of his fellow-workers as to responsibility, results produced, and time of operation.[21]

Thus, it is the coordination of the parts so divided that is, from at least the practical standpoint, the real essence of the principle; an incorrect synthesis might lose all the advantages gained by a correct analysis. It is conceivable that work might be divided quite minutely and then be put back together in exactly the same way, or in some way less effective than the original. Likewise specialization might be carried out to the last degree without at all bringing together again and coordinating the various specialized parts. Analysis alone can serve only to provide for the better understanding of a problem; in order that its economic advantages may be fully realized it must be followed by a new synthesis.[22]

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[20] P. Sargant Florence, *The Logic of Industrial Organization* (London: Kegan Paul, Trench, Trubner and Company, Ltd., 1933), p. 240.

[21] Dexter S. Kimball, "Economic Principles," in L. P. Alford (ed.), *Management's Handbook* (New York: The Ronald Press Company, copyright 1924), p. 1212.

It may also be argued with good cause that the principle of coordination or combination of labor is subsumed by the broad principle of proportionality. This principle in its broader aspects does indeed include combinations of all kinds, as Davenport recognizes:

> The ultimate principle underlying what is commonly known as the law of diminishing returns, and underlying this law in all its different applications, is, when stated in its most general form, an almost self-evident truth, namely, that *disadvantage attends any excess or defect in the supply of productive factors relatively one to another*. This large general law we shall term the law of the *Proportion of Factors*. It affirms nothing more than the disadvantage from bad combination in all production and in all business undertakings.[23]

He further notes the application of this principle to management:

> On the one hand he [the entrepreneur] must have care to restrict his operations to conform to his managerial capacity and to his supervisory abilities; on the other hand he must not allow any part of his supervisory abilities to run to waste. Everything in proportion; The great bad, as Jane Carlyle remarked, is in mixing things,—badly.[24]

Alfred Marshall also, following a different line of procedure, notes a close connection. In stating the law of increasing returns, he says that "An increase of capital and labor leads generally to an improved organization. . . ."[25] Finally, Edward D. Jones, in discussing his principle of coordination, explains as follows:

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[22] See A. H. Church, "Management and Its Two Great Instruments," in Leon C. Marshall, *op. cit.*, p. 767.

[23] From Herbert J. Davenport, *The Economics of Enterprise* (1918), pp. 423-424. By permission of The Macmillan Company, publishers.

[24] From Herbert J. Davenport, *The Economics of Enterprise*, p. 433. By permission of The Macmillan Company, publishers.

[25] From Alfred Marshall, *Principles of Economics* (2nd ed.; Vol. I.; 1891), p. 376. By permission of The Macmillan Company, publishers.

> Each agency in an organization, whether that agency be a gang in a shop, or a corps in an office, or a stand of machines adapted to a process, should be brought to such a degree of productive power as to be able to perform as much of its kind of work as the functioning of the other agencies will render necessary. The test of perfect coördination is equivalent marginal utility. The last doses of labor force, executive attention or invested capital applied to the various functions of an enterprise should bring in substantially equivalent profitable returns.[26]

Although these quotations may tend to indicate the identity of the principles of proportionality and of organization or coordination of labor, economic and industrial literature as a whole does not substantiate this relationship. Most treatises on production economics emphasize the importance of the laws of varying returns and costs but seldom mention any application of the principle of proportionality to organization. Likewise, treatises on administration, organization, and management usually give rather meager space to these laws, but they do stress the value of correct principles of organization.

Reasons for this failure to note any similarity in these two different applications of the principle of proportionality are perhaps evident to most students. The laws of varying returns are usually stated in terms of some two of the economic factors of production, one of which is held constant while the other is made to vary in quantity. So stated, these laws do not have ready application in the science of organization. The difficulty, of course, is that in the first place the industrial organizer does not deal with the factors *en masse*; in the second place he does not have the occasion to hold all factors constant except one, with units of which he may "dose" the constant factor or factors; and, in the third place, all units of each factor are not identical in kind or quality—none of these factors are fungible goods.

As useful as these laws may be to the social scientist who must deal with generalities and lump-sum quantities, the industrial organizer finds slight use for these concepts. As previously pointed out, the combining of human effort with units of space, energy, machines, or capital takes place in minute quantities and usually in quite definite proportions. Labor as a body is not lined up and matched with so much capital as such.[27] The quantity of each productive factor used in the course of production is merely the sum of the minute quantities of each determined by the technicalities of the numerous operations of the production system. Moreover, when the industrial manager adds an extra man or machine to his combination, this man or machine is not any member of that respective category, but usually a very specific member selected to fit exactly a particular requirement. It is only when each is given a price and measured in terms of its value that either men or machines can be dealt with as interchangeable units. The principle of proportionality as applied to organization is therefore more nearly a principle of exact proportions than of varying proportions.

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[26] Edward D. Jones, *The Administration of Industrial Enterprises* (New Impression) (New York: Longmans, Green and Company, 1920), p. 144.

The principle of proportionality as applied in the science of organization is usually stated as the principle of coordination. As such it has been expressed as follows: "Definite mechanisms and routines must be provided to the end of causing all groups within an organization to function harmoniously toward the attainment of the common objective."[28] It may be stated also as the principle of cooperation, and expressed as follows: *"The effort of two or more individuals working as a unit toward a common goal is greater than the sum of the effort of the individuals working as individuals."*[29] It finds expression also in the law of balance, which has been stated by John Calder: "The duties of the members of the organization are distributed so that unequal loading is avoided."[30] This principle finds, therefore, many expressions in organization literature, and it should not be overlooked as one of the fundamentals of the science. In fact, it may be considered the one principle of organization, for example: "The next thing in order is to explain what we mean when we call *coordination* the first principle. We mean that this term expresses the principles of organization in toto; nothing less."[31]

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[27] See Thomas N. Carver, *The Distribution of Wealth* (New York): The Macmillan Company, 1924), p. 86.

[28] Thomas R. Jones, *Theories and Types of Organization* (Production Executives' Series No. 83; New York: American Management Association, 1929), p. 30.

[29] William B. Cornell, *Organization and Management* (New York: The Ronald Press Company, copyright 1936), p. 62.

[30] "Organization," quoted in C. E. Knoeppel, *op. cit.*, p. 224.

OBJECTIVE OR PURPOSE

The third basic principle in the science of organization may be termed the principle of objective or purpose. It has been emphasized repeatedly that an organization must be particularly adapted to the work it has to perform. It must suit the problem at hand, and it must fit the system established by the technicalities of the productive process. It must accommodate itself to its environment and the peculiar conditions imposed upon it. It must also take into consideration the facilities available, whether physical equipment or human beings. In the words of Mr. Farquhar:

> It is our point of view that the organization for any particular enterprise is discovered and not arbitrarily made; discovered in the technical requirements and personal assets of the particular situation. Accepting this point of view, the proper practical procedure of discovery is somewhat as follows: first, a clear definition of the objective of the enterprise; second, a technical analysis by main and subdivisions of the ways of accomplishing the objective, regardless of the availability of a technically competent personnel; third, a survey of available personnel from the point of view of capacities; and fourth, a reconsideration of functional activities in the light of available personnel.[32]

It is not enough that an organization be adapted to its work, conditions, and facilities, but it must also be oriented toward its objective or purpose. This idea may be developed under two heads: under the first, emphasis is upon the objective of the enterprise as a whole; and, under the second, consideration is given to the purpose or purposes of only the organizational aspect of the enterprise. The first of these ideas has been incorporated as the principle of objective, and stated thus: *"Prerequisite to the starting of any business enterprise, or to the carrying on of any activity by the concern as a whole or by any unit of it, a clear and complete statement must be made of the objectives in view."*[33]

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[31] James D. Mooney and Alan C. Reiley, *Onward Industry!* (New York: Harper and Brothers, 1931), p. 19.

[32] Henry H. Farquhar, "Functional Organization," in The Taylor Society, *Scientific Management in American Industry* (New York: Harper and Brothers, 1929), p. 145.

The second of these ideas has not, as such, found ample codification or emphasis in organization literature. It may not always be recognized that there can be or should be a purpose in organizing other than the general objective of the enterprise. Or it may be thought that the purpose of good organization is self-evident and that it consequently needs no particular elaboration. However, modern industrial leaders are recognizing in industry a new element, or if not a new element, an old one that must be handled in a new way. In other words, it is now realized that by organizing according to sound principles something can be contributed to an enterprise which was formerly considered of little value or else thought to be obtained by other means or through other attributes. "It is significant that managers of first rank are to-day placing an emphasis upon certain qualities in a way which would sound somewhat strange in the trust magnate of twenty years since. *Esprit de corps*, coöperation, is the keynote."[34]

For convenience in distinguishing this second idea from that termed the principle of objective, it may be called the principle of purpose. Although no author so styles this idea, a review of quotations from various sources will reveal a remarkable emphasis being placed upon this feature of the essential purpose in organization construction. These purposes may be listed as follows:

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[33] William B. Cornell, *op. cit.*, p. 39.

[34] From Enoch B. Gowin, *The Selection and Training of the Business Executive* (1918), p. 197. By permission of The Macmillan Company, publishers.

1. Control: "The primary object in organization is *control.* All considerations are to be centered around that one primary objective."[35]

2. Cooperation: "Coöperation of employees is the first purpose of organization."[36]

3. Organization of Experience: ". . . the organization of experience is the task of the leader in any business or industry."[37]

4. Information and Memory: "The character and extent of organization and methods used by every executive should be in direct proportion to the need for supplementing memory and for coordinating information, and no more."[38]

5. Man Building: ". . . man building is the real purpose of organization development; that in so far as you develop men, you develop the organization; that as you make work profitable to your men, you make it profitable to the organization."[39]

6. Automaticity: "It should be the aim of the manager to organize his business so that it will 'run itself.' When a business is so organized, the manager is then able to devote his time to larger affairs, leaving the details to be worked out by competent department managers."[40]

7. Enthusiasm and Effort: "Efficiency in organization demands definite knowledge of methods of securing individual effort and enthusiasm as well as departmental coordination."[41]

8. Individual Effectiveness: "The first great object of

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[35] P. F. Walker, *Management Engineering* (New York: McGraw-Hill Book Company, Inc., 1924), p. 217.

[36] From Norris A. Brisco, *Economics of Business* (1920), p. 84. By permission of The Macmillan Company, publishers.

[37] M. P. Follett, "Leader and Expert," in Henry C. Metcalf, *The Psychological Foundations of Management* (Chicago: A. W. Shaw Company, 1927), p. 232.

[38] John H. Williams, "Policies and Methods of the Chief Executive," in Daniel Bloomfield (ed), *The Modern Executive* (1924), pp. 79-80. By permission of The H. W. Wilson Company, 1924, pp. 79-80.

[39] C. E. Knoeppel, *op. cit.*, p. 25.

[40] From Samuel E. Sparling, *Introduction to Business Organization* (1919), pp. 6-7. By permission of The Macmillan Company, publishers.

[41] Hugo Diemer, *Factory Organization and Administration* (3d ed.; New York: McGraw-Hill Book Company, 1921), p. 5.

organization in the art of management is to make each individual in the whole body count for his maximum."[42]

9. Collective Responsibility: "This is the problem in business administration: how can a business be so organized that workers, managers, owners, feel a collective responsibility?"[43]

10. Teamwork: "The nice point in executive organization is to make the fullest use of individualism that is consistent with teamwork, for then we are insuring the flow of fresh ideas, while at the same time we are not letting individualism run riot."[44]

11. Will: "The organization of the will of his employees" is the major task of the chief executive.[45] "What the manager has principally to handle, therefore, is not wood or metal, but human nature; not machinery, but will."[46]

12. Leadership: "An organization must not be built merely to follow a leader; rather, the factors of leadership should be built into the whole structure."[47] "In other words, a good organization is a happy combination of leaders and followers. The inefficient organization is one in which leaders are working as followers, with followers who possess qualities of leadership."[48] "Therefore a form of organization must be adjudged good or bad according to whether it encourages or discourages leadership."[49] And according to Lamson:

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[42] Morris L. Cooke, *Academic and Industrial Efficiency* (Bulletin No. 5; New York: Carnegie Foundation for the Advancement of Teaching, 1910), p. 13.

[43] M. P. Follett, "The Psychological Foundations: Business as an Integrative Unity," in Henry C. Metcalf, *Scientific Foundations of Business Administration* (Baltimore: The Williams and Wilkins Company, 1926), p. 158.

[44] From *The Organization of Modern Business* (1921), p. 166, by William R. Bassett. Used by permission of the publishers, Dodd, Mead & Company.

[45] Erwin H. Schell, *The Technique of Executive Control* (New York: McGraw-Hill Book Company, Inc., 1926), p. 8.

[46] Sidney Webb, *The Works Manager To-Day* (New York: Longmans, Green and Company, 1918), p. 4.

[47] Henry S. Dennison, *Organization Engineering* (New York: McGraw-Hill Book Company, Inc., 1931), p. 128.

[48] C. E. Knoeppel, *op. cit.*, p. 18.

[49] From *The Organization of Modern Business*, p. 153, by William R. Bassett. Used by permission of the publishers, Dodd, Mead & Company.

> Our problem, then, is to devise a type of organization and control which will enable that top leadership to realize itself most completely in effective action, and to inspire and enable others throughout the organization to become creative leaders in their own fields and in their relations with their immediate associates.[50]

Still other purposes might be cited, for as Dennison has observed: "The specific purposes which organizations are created to serve are almost as widely varied as their membership."[51] Although these many purposes of organization may be cited, there is revealed a striking kinship among these and others that abound in the modern literature on the subject. This kinship suggests the possibility of combining these various purposes to constitute one main or summary purpose. If such a conclusion be justified such a purpose might be called that of *esprit de corps,* or better, morale, or morale building and maintaining. It might be equally well said that the main purpose in organization construction is the provision of effective "leadership machinery" throughout all ranks and groups of the personnel, or possibly, after Veblen, "interstitial leadership."

There is one essential reason for emphasizing morale or "interstitial leadership" as the main purpose or objective to be striven for in organization building—a reason that was not always plausible in the past. With the impetus of mechanization and mass production, enterprises have been induced to expand to enormous size. Having so grown they have confronted a serious handicap in size alone. This handicap is widely recognized in economic literature. Taussig's explanation is:

> The limitations on large-scale production arise mainly from the infirmities of human nature. The extension of the scale of operations means an ever increasing reliance upon hired labor and an ever-lessening reliance on spontaneous self-interest. If all men worked with as much energy and spirit for an employer as they do for them-

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[50] Fredrick L. Lamson, "General Administrative Organization and Control," in G. T. Schwenning (ed.), *Management Problems* (Chapel Hill, University of North Carolina Press, 1930), p. 251.

[51] Henry Dennison, *op. cit.,* p. 6.

> selves, the spread of large-scale production would be almost without bounds.[52]

By the size of present-day industrial organizations apparently these limitations have been practically overcome, and the overcoming factor is, in large measure, organization. As affirmed by Florence: "Apart from the economists, however, those who have made a special study of organization come to the conclusion that no limit is set to the size of organization if correct principles are adopted to enable the single leader to delegate control."[53]

It is sometimes said that this factor is administration, management, or leadership. If so, it is not of the old one-man kind. The influence of one man (except he be a genius) or of even a few men, cannot impregnate every group or function throughout the ramifications of a vast enterprise. Leadership itself is the function of administration and management, but the provision of "leadership machinery"—the instrumentalities through which leadership is made effective in all ranks—is the problem of organization.

Thus when it is said that purpose is one of the principles in organization building it is meant that the primary purpose in constructing a *good* organization should not be overlooked, that this primary purpose is to provide for and enhance that intangible element of *morale,* and that every other purpose that the organization may have should contribute to its primary purpose. In so doing, every situation should be analyzed in order to discover weak links in control, gaps in responsibility, positions having too much or too little authority, irritating managerial policies, sources of friction between executives themselves and between executives and workmen, the failure to utilize employee participation in management wherever it might be utilized effectively, etc. It is in such situations as these that organizations are as a whole made good or bad, strong and enduring or weak and ready to war with its own administration upon slight cause or reason.

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[52] From F. W. Taussig, *Principles of Economics* (2nd revised ed.; 1918), p. 55. By permission of The Macmillan Company, publishers.

[53] P. Sargant Florence, *op. cit.,* p. 116.

DELEGATION OF AUTHORITY AND RESPONSIBILITY

A fourth basic principle of organization may be known as the principle of delegation. This principle has been well explained by Mooney and Reiley.

> Delegation means the conferring of a certain specified authority by a higher authority. In its essence it involves a coordinated responsibility. The one to whom the authority is delegated becomes responsible to the superior for doing the job. The superior remains responsible for getting the job done. This principle of delegation is the center of all processes in formal organization.[54]

As to its importance, they add: "The psychics of delegation are as vitally important as those of coordination and leadership, in fact the most important psychic test of true leadership is the way it delegates its authority."[55]

The significance of delegation is duly recognized in organizations of large size. Here neither the chief executive nor his major assistants can even begin to supervise personally all its widespread activities. It is said, in fact, that the only proper function of the major executives of a large organization is that involved in the delegation of authority and responsibility and in its sequel, receiving reports and checking up. In other words, the higher or administrative officers of any organization should be entirely free of specific duties or functions as recorded in the organization manual. As soon as any activity or function becomes sufficiently crystallized to permit of its definition and description it should be assigned to an assistant for performance. These officers are thus constantly stripping themselves of duties and passing them down the line. This being done, they may devote their attention to new problems, and perhaps to the discovery of new functions to be likewise delegated.

The principle of delegation is best exemplified in organization literature by various laws and rules which pertain to the proper application of the principle in some particular respect. A statement of each will indicate its particular nature and application.

[54] Mooney and Reiley, *op. cit.*, p. 35.

[55] *Ibid.*, p. 38.

1. Perhaps the best known of these laws is that enunciated by Gantt: "If there is any one principle, which more than any other, is influential in promoting the success of an organization it is the following: *The authority to issue an order involves the responsibility to see that it is properly executed.*"[56] As it is more briefly stated by Rorty: "Responsibility should always be coupled with corresponding authority."[57]

2. The principle of delegation of responsibility, according to Jones: "Any person or executive assigned to the carrying out of any function or operation or group of functions or operations must have sole and complete responsibility for the carrying out of the duties assigned."[58]

3. The principle of accountability, by Jones: "Each person shall be strictly and solely accountable in terms of results to his superiors for all duties assigned to him."[59]

4. The principle of centralization of authority and responsibility: *"There should be centralized executive control."*[60] And as Cornell explains further: "The principle of centralized executive control with delegation of authority and responsibility requires the establishment of definite lines of supervision and a tapering of authority from the chief executive down to the junior executives and the foremen in direct charge of the workers."[61]

5. This explanation suggests perhaps another, which may be called the law of definiteness. According to Rorty: "Definite and clear cut responsibilities should be assigned to each executive."[62] Also: "No change should be made in the scope or responsibilities of a position without a definite understanding as to that effect on the part of all persons concerned."[63]

6. Several laws or commandments are concerned with

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[56] H. L. Gantt, *Industrial Leadership* (New Haven: Yale University Press, 1916), p. 8.

[57] M. C. Rorty, *Ten Commandments of Good Organization* (A Poster, New York; American Management Association).

[58] Thomas R. Jones, *loc. cit.*

[59] *Ibid.*

[60] William B. Cornell, *op. cit.*, p. 45.

[61] *Ibid.*

[62] M. C. Rorty, *loc. cit.*

[63] *Ibid.*

the establishment of line authority: "No officer or employee, occupying a single position in the organization, should be subject to orders from more than one source."[64]

7. The same is true of functional authority: Each individual must be "limited in the function he performs, but unlimited in the area over which he exercises that function."[65]

There are, thus, numerous laws and rules for the delegation of authority and responsibility throughout the ramifications of a complex organization. The structure of an organization must be so designed and adapted that delegation is facilitated and enhanced, without friction, obstruction, or misunderstanding. In fact, the ease and effectiveness with which duties and responsibilities are automatically delegated is often regarded as a test of efficient administration and of the organization which makes it possible. Many otherwise able men fail as administrators or executives because they do not provide adequately for delegation. They make the fatal mistake of reserving final judgment to themselves on every matter of even minor importance. Consequently, able and worthy assistants are mere "office boys"; they dare not assume the initiative which they are capable of assuming; and they dare not assume responsibilities, knowing their authority is not adequate for their fulfillment. Many a chief would vastly increase the efficiency and resourcefulness of his executive staff if he would prepare an accurate organization chart depicting a delegation of responsibilities coupled always with commensurate authority, and then memorize this chart himself and adhere to it religiously.

LAWS AND RULES OF ORGANIZATION

There are many other laws and rules relating to the planning of organization structures which do not elucidate or exemplify any particular principle except perhaps in an indirect way. A statement of each will serve to indicate its nature.

1. The law of permanency. As stated by C. E. Knoeppel:

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[64] *Ibid.*

[65] Henry H. Farquhar, *op. cit.*, p. 138.

"Training men to fill other positions than their own and providing for understudies so that changes in an organization may easily be made without disruption."[66]

2. The law of cross fertilization. This law involves: "Giving each pivotal man in an organization some opportunity during the year to know the methods of the departments his work influences mostly and of the departments which influence his work."[67]

3. The law of staff and conferences: "Creating an analytical and advisory body in an organization to co-operate with the executive as well as a conference plan to make it difficult to determine where staff advice ends and line acceptance begins.[68] It may be noted that this law is not acceptable to many students of organization.

4. The law of adaptability to human material: "The individual duties of the members of an organization must be so assigned that most of them are within the powers of most people. . . ."[69]

5. A law of functional grouping may be contained in a statement made by Coney:

> A functionalized organization is most satisfactory when each function is performed by no less than a single person and when all the work of each function is done in a single place. Under such a standard, supervision and control would be facilitated by the presence of all workers engaged in a single kind of work in one place, and no single individual would have a divided interest through the need to perform more than one kind of work.[70]

6. A rule of appointment may be deduced from statements made by Henry P. Kendall: Do not permit an executive to select his assistants, for

> . . . an executive is not likely to select an assistant who is complementary to and rounds out his personality and capacity. . . . On the other hand, there must not be

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[66] C. E. Knoeppel, "Laws of Organization," in Leon C. Marshall, *op. cit.*, p. 792.

[67] *Ibid.*

[68] *Ibid.*

[69] Henry S. Dennison, *op. cit.*, p. 134.

[70] Donald Coney, "Scientific Management and University Libraries," in G. T. Schwenning, *op. cit.*, p. 184.

too great a difference in characteristics. If the chief executive and his assistants are wise in the selection of junior executives, they will supplement a major executive with an assistant of a complementary type—enough different to stimulate him, but not so different as to impair *esprit de corps.*[71]

7. Law of internal inspection or criticism: "No officer or employee should ever be required, or expected to be at the same time an assistant to, and critic of, another."[72]

8. Rule of decentralization: "Any decision should be made at the lowest point in the organization at which the decider possesses all the facts necessary for a sound decision."[73]

9. Rule of size: "Each new group of ten, twenty, or thirty workers requires a new foreman; two, three, four or five foremen require a shop manager; two, three, four or five shop managers require a departmental manager . . . and the number of ranks continues to increase in this way up to the very top, each new official having usually not more than four or five immediate subordinates."[74]

10. Rule of measurability: "The manager, finally, wants his organization as a whole, and with respect to each unit, definitely measurable as regards day-to-day operations."[75] "Any officer whose work is subject to regular inspection should, wherever practicable, be given the assistance and facilities necessary to enable him to maintain an independent check of the quality of his work."[76]

Still other principles, laws, and rules might be cited. However, the line must be drawn somewhere between organization and management. Some of the laws or rules cited above pertain partly to management, and likewise, many management principles and laws involve to a large extent organization. It is noticeable in organization and management literature that what one author may call principles of organization another may call principles of management. The fact of the matter is, of course, that no hard and fast line of distinction can or should be drawn between these subjects, for they are but two different phases of one larger subject of administration.

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[71] Henry P. Kendall, "The Problem of the Chief Executive," in Edward E. Hunt (ed.). *Scientific Management Since Taylor* (New York: McGraw-Hill Book Company, Inc., 1924), p. 69.

[72] M. C. Rorty, *loc. cit.*

[73] Henry P. Dutton, *Principles of Organization* (New York: McGraw-Hill Book Company, Inc., 1931), p. 155.

[74] Henri Fayol, *Industrial and General Administration* (London: Isaac Pitman and Sons, Ltd., 1930), p. 43. See also V. A. Graicunas, "Relationship in Organization," in Luther Gulick and L. Urick, *Papers on the Science of Administration* (New York: Institute of Public Administration, Columbia University, 1937), pp. 183-187.

[75] Henry H. Farquhar, *op. cit.,* p. 139.

[76] M. C. Rorty, *loc. cit.*

Principles and laws of organization should deal only with setting up the structural plan of the organization, or the system of relationships between the various positions and functions necessary to form a productive organic unit. Principles and laws of management should be concerned with operating policies, with systems of procedure, with methods of giving orders and instructions and controlling the various activities of the personnel. As indicated previously, an organization is a static framework of positions or functions and their relationships. Management principles and laws are needed to effectuate those of organization and administration, and to make the skeletal entity a dynamic, "going concern."

Although the process of organization should for most part antedate management, the work of organizing is not by any means complete when the personnel is employed and management takes charge. The management of a perfectly constructed organization must be constantly repairing, adjusting, and reorganizing in part in order to keep its structure adapted to current conditions and attuned to the particular needs and the psychology of its personnel. The primary purpose of management is neither to build good organizations nor to apply correct organization principles, but to get the required work of the enterprise accomplished somehow. However, management cannot proceed in accomplishing its primary function in such a manner as to destroy its organizational machinery and thereby cripple itself. Correct management principles should serve to strengthen its own structure as well as use effectively that structure in achieving its main purpose. They are essential for realizing the advantages made possible by scientific organization.

In conclusion, it must be recognized that a body of principles and laws such as these which have been abstracted from the discussion and exposition that accompanied them are sometimes misinterpreted. The person unfamiliar with the purposes and the method of scientific organization and management often fails to appreciate their importance or to understand their proper service and application. And indeed it is perhaps better that the layman underestimate their significance than that he attach more importance to such statements than is due. Too often business executives and beginning students of organization have tended to make a fetish of certain laws, policies, and rules, and of systems, techniques, and devices. Moreover, they have too often sought to apply what they did not thoroughly understand. Laws of organization and management, as well as those of economics and other social sciences, have their particular applications and limitations which must be correctly evaluated before the general truth borne out in the statement of the principle or law has meaning or significance.

It may be observed, furthermore, that laymen and beginners in the field of management and organization often acquire an attitude of doubt or bewilderment concerning the validity and the applicability of all such principles, laws, or other generalizations. Such a reaction is indeed to be expected of the cautious and critical student, for at first he cannot see the forest for the trees, or the general truths for the many particulars. Moreover, the student may often be strengthened in this agnosticism by the inevitable remark of the business executive, "but my business is different," or, "we have a peculiar situation here." However, as the student observes more businesses, studies more situations, and analyzes more cases, generalizations begin to emerge, the outline of the forest begins to take form. The individual businesses and peculiar situations, as well as the trees, are still there, but there are now also classes, types, and underlying principles and laws. Ultimately, the student is likely to become more impressed with the principles, the types, and the generalizations which his research has revealed than with the exceptions and the many variations in application. Such, at least, has been the evolutionary development of thought of more than one student in this field.

CHAPTER VIII

BROADER ASPECTS OF ORGANIZATION

Scientific organization has been developed along with, and as a part of, scientific management. The organizational aspect of scientific management was not, however, particularly emphasized in the beginnings of the management movement, for several reasons. First, organizations were of comparatively small size, small enough in most cases to be influenced and dominated by the forceful personality and the personal leadership of the chief executive. Second, the rights of labor in industry did not demand particular consideration, and labor organizations were not strong enough to make their demands imperative. Labor was more of a resource to be exploited than a partner to be taken in and given a permanent position in the organization. And finally, at that time there was a customary way of organizing which no one had thought to challenge. In the words of Mr. Jones:

> Business secured its original ideas of organization from the military. The basis of operation was an individual. This person was the court of last resort in all plant matters.
>
> Management under such an organization was based in great part upon fear. The instructions of "the boss" were unquestioned.[1]

And he adds: "That type of organization to a large extent is now obsolete."[2] Scientific management did, however, lay the foundation for the science of organization. This is indicated by an examination of Taylor's four principles of scientific management.

THE PRINCIPLES OF SCIENTIFIC MANAGEMENT

The principles of scientific management were explained and stated in one form by Taylor as follows:

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[1] Harold F. Jones, "Standardization of Methods," in *Industrial Leadership* (The Society of Industrial Engineers Vol. IV, No. 5, June, 1921), p. 98.

[2] *Ibid.*, p. 99.

> Scientific management, in its essence, consists of a certain philosophy, which results, as before stated, in a combination of the four great underlying principles of management:
>
> *First.* The development of true science.
> *Second.* The scientific selection of the workman.
> *Third.* His scientific education and development.
> *Fourth.* Intimate friendly cooperation between the management and the men.[3]

These principles are also fundamental to the science of organization, and to progressive industrial management, as an explanation of each principle will show.

The first principle is the principle of research. Taylor's own experiments with machines in "The Art of Cutting Metals," and his many experiments with men in their simple and complex activities, are classic examples of the application of the scientific method. Out of his researches have grown directly the operation study and job analysis upon which the science of organization is built. This principle has been emphasized repeatedly throughout this study, and it is only necessary to assert further that, without this experiment, research, or analysis, scientific organization has no lawful claim to its title. Indeed, scientific research is the *sine qua non* of the whole movement in organization and management.

Research, important as it may be, is not entirely all that this first principle includes. Standardization, the next step following and dependent upon scientific research, has been the essential factor in making possible, and profitable, mass production, large-scale enterprise, and consequently large organizations. Standardization is at present a fundamental characteristic of nearly every phase of production. In organization there have been established standard motions, cycles of motions and entire operations. These standards cover the cost, the time, and the manner of performance, and many of the facilities and the conditions involved in the system of work. These standards along with standard practice instructions and standard job specifications are the very building stones with which an organization may be scientifically constructed.

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[3] F. W. Taylor, *The Principles of Scientific Management* (New York: Harper and Brothers, 1911), p. 130.

Taylor's first principle is more logically followed by another principle not mentioned in the list given above, but elsewhere designated as his fourth:

> *Fourth.* There is an almost equal division of the work and the responsibility between the management and the workmen. The management take over all work for which they are better fitted than the workmen, while in the past almost all of the work and the greater part of the responsibility were thrown upon the men.[4]

This principle includes, apparently, the functions that are usually called planning, control or production control, and organization.

Planning, under scientific management, is the function of a specialized corps. The workmen no longer lay out and plan their work, nor do some of their foremen and supervisors. All planning, even down to the tools a workman should use, the set-up of his machine, and the manner of work, is the responsibility of a specialized planning department or function.

Control is also made a special function and placed under the responsibility of experts. This function involves the control of every aspect of the work process. There is inspection for quality control, cost accounting and budgets for financial control, perpetual inventories for material control, control boards of various kinds for machine and operation control, and finally, organization charts, routines, instructions, and other devices for personnel control.

In accordance with this principle of scientific management the organization should be definitely planned in regard to duties and relationships; authority should be predetermined for each phase of the work, and specialists provided for the various functions such as research, planning, and control. Functional foremanship is the particular contribution of scientific management in respect to organization. This form of organization has been discussed at length in the preceding pages, and it is necessary here only to designate its place in relation to the four principles. Its importance in the whole system of scientific management is indicated, although possibly overemphasized, by Alfred Marshall, who says:

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[4] *Ibid.*, p. 37.

> . . . Scientific Management is in the main a method of redistributing and reorganizing the functions and the mutual relations of the personnel of a great business, with the purpose of increasing aggregate efficiency by narrowing the range of responsibility of most of its employees, and bringing careful studies to bear on the instructions given in regard to the simplest manual operations.[5]

The second and third of Taylor's principles as stated above are grouped together to form the second principle in his other classification. This principle consists of the scientific selection, training, teaching, and developing the workmen.[6] This principle is the equivalent of the modern function of personnel. Taylor did not go very far in the scientific application of this principle, but his work presaged much that is fundamental to modern personnel management and industrial psychology. His contribution to this field is justly recognized by Dr. Viteles, an eminent industrial psychologist, who says:

> Taylor's program of scientific management is probably America's most distinctive contribution to industrial evolution. This appears to be true in spite of its unsavory past, when the task-system and the methods associated with it were used to exploit the worker instead of to raise standards of living and accomplishment, as Taylor had sincerely hoped that they would.
>
> In a large sense Taylor and the movement which he originated furthered the development of industrial psychology. Taylor set the stage for industrial psychology by proving that it pays industry to use specialized techniques for selecting competent workers, for training them, and studying the most effective ways for applying energy to work. He showed that it is economically sound to study human behavior in industry with a view of increasing the effectiveness of the human element. . . .

[5] From Alfred Marshall, *Industry and Trade* (1920), pp. 368-9. By permission of The Macmillan Company, publishers.

[6] F. W. Taylor, *op. cit.*, p. 36.

> Industrial psychology is building in other ways upon the foundation of scientific management. In the first place, it is interested in the same sort of problem, although it has applied to these problems a knowledge of the processes of human behavior not possessed by Taylor and a regard for human welfare seldom stressed by his followers. In addition . . . industrial psychologists have adopted, in modified form, a number of the techniques devised by the exponents of scientific management.[7]

Scientific organization depends absolutely upon scientific personnel administration to put into effect its principles and plans. An organization is nothing but charts, diagrams, routines, manuals, instructions, or merely *words*, until the function of personnel comes on the scene to select the men who are to fill the positions mapped out and described in the organization plan, and to train them for their respective duties and in their various relationships. This function should be exercised by specialists trained for this work, for it is evident that if this function is improperly performed all the advantages of a scientifically correct structure will come to naught. It cannot be too strongly emphasized, therefore, that scientific personnel administration is essential to effective organization and management.

The fourth principle of scientific management, as listed above, "intimate friendly cooperation between management and men," is perhaps the "biggest" principle of all. However, it has received the least exhaustive treatment of a scientific nature.

Taylor's particular contribution in this respect is his differential piece-rate plan of wage payment and his functional foremanship. He attempted to measure the productivity of each individual worker and to base his wage upon the number of pieces made, with a progressively increasing premium for time saved when the standard output was exceeded. In this way it was sought to share with the worker the prosperity of the concern resulting from his individual productive efficiency. In addition to this high incentive wage, Taylor resorted to his own personality and his reputation for honesty and fair dealing to win for him the loyalty of his employees. He dealt with his labor as individuals, one at a time, and on a man-to-man basis. He relied on personal exhortation, on example, demonstration and proof, on promises kept, and particularly on high wages and good working conditions to hold his men to him in friendly cooperation. In this he seems to have had little difficulty.

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[7] Morris S. Viteles, *The Science of Work* (New York: W. W. Norton and Company, Inc., 1934), pp. 49-50.

Taylor's greatest difficulty in applying his principles was in winning over the managers and higher executives, an experience shared by others working in the same capacity. According to Harrington Emerson:

> One more word of agreement with Mr. Taylor. In this work of scientific management, the great difficulties that we have encountered have come not from the workingmen but from the management; always from the managers, never from the workers; sometimes from the managers of the workers, not from the workers themselves.[8]

The importance of this principle is fully recognized in modern scientific organization. The principle of purpose, as explained in the preceding chapter, indicates the importance attributed to this one element. According to that principle the primary purpose in organization building is to instill in the body of workers a spirit, making the body thereby account for more than the sum of its individual members. This intangible element is variously designated as *esprit de corps*, morale, interstitial leadership, or, perhaps, intimate friendly cooperation. By whatever name it may be called, and by whatever means it may be attained, this factor is vital to the functions of administration, management, and personnel as well as organization.

The importance of the principle being recognized, the next question, and really the more pertinent question, is how this element can be acquired and incorporated into the structure of an organization. In so far as it can be provided by the function of organization alone, there appear to be two essential methods, in addition, of course, to the facilitation made possible by scientific organization in general, as previously described. The first of these may be called, for convenience, scientific autocracy, or the dictatorship of science. The second may be designated by way of contrast as industrial democracy, meaning any form of organization in which the workers have some voice in the administration of the internal affairs of the enterprise.

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[8] Harrington Emerson, "The Opportunity of Labor Under Scientific Management," in *Scientific Management* (Hanover, N. H.: The Amos Tuck School of Administration and Finance, Dartmouth College, 1912), p. 104.

By scientific autocracy is meant that science, rather than the arbitrary will of either the management or of the workers as a whole, is relied upon to dominate the organization and to mete out justice to all parties concerned. It means a respect and a reverence for scientific facts and laws, on the part of both men and management. Authority for any particular function or activity is entrusted to the one having most knowledge of that function or activity, regardless of rank or position. It results, therefore, in rule by the expert, who may be selected by management, the men, the government, or some outside agency. Taylor and his followers had sublime faith in this method. It is exemplified in the following statement by Harrington Emerson: "What can properly be done in an hour is for neither the men nor the employer to determine. It is as technical a problem as calculating an eclipse."[9] Thus, every conceivable question concerning the internal affairs of an industry must be studied to discover the facts and the law or laws of that situation. These laws included not only the laws of physical nature but also laws of psychology and physiology, which were not more often referred to by the founders of scientific management only because they were not then known and established.

Rule according to this method depends upon a thorough indoctrination of the personnel with the scientific attitude. It depends upon creating an enthusiasm for definiteness in organization structure and in duties and responsibilities. Under this method men are taught to do the correct thing. They are led to worship exactness, efficiency, and the avoidance of waste, and to resent personal autocracy and domination. In accordance with this philosophy: "Nothing is more galling to the worker than to be compelled to go on doing things in a way he knows to be wrong, or at least wasteful and inefficient, because he knows that if he speaks about the matter he will be told, 'You are not here to think, you are here to obey orders.' "[10] Even in matters of supervision and discipline there is an attempt to replace personal authority by the facts and the authority of the situation. As Viteles explains it:

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[9] *Ibid.*

> One of the chief responsibilities in supervision, particularly in the case of junior executives, is the enforcement of company regulations governing such matters as promptness and regularity of attendance, the disposition of company time, obedience to reasonable requests, conformity to safety regulations, etc. There are two contrasting procedures for accomplishing this objective—the exercise of *discipline* and the development of morale. The first may be briefly defined as *enforced obedience to external authority*; the second as *obedience to external circumstances which has its source of authority within the man or group.*[11]

Although this method is not dependent upon any particular structural type of organization, the type developed by Taylor is usually conceded to be most advantageous in facilitating this method. This is the functional plan as previously explained. It provides best for an extreme division of labor and rule by the specialist regardless of his rank. In fact a characteristic of this type is, "workmen reminding their 'bosses,' in no uncertain terms, of their failure to live up to their managerial responsibilities."[12] It is this emphasis upon obeisance to individual duty and responsibility that makes the functional type particularly adapted to scientific autocracy.

It is interesting to note in this connection that Taylor might have got his idea of the functional type from educational institutions, and not from military organizations, for he says:

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[10] A. Barratt Brown, *The Machine and the Worker* (London: Ivor Nicholson and Watson, Ltd., 1934), p. 149.

[11] Morris S. Viteles, *Industrial Psychology* (New York: W. W. Norton and Company, 1932), p. 616.

[12] C. Bertrand Thompson, *The Theory and Practice of Scientific Management* (Boston: Houghton Mifflin Company, 1917), p. 83.

Before leaving this portion of the subject the writer wishes to call attention to the analogy which functional foremanship bears to the management of a large, up-to-date school. In such a school the children are each day successively taken in hand by one teacher after another who is trained in his particular specialty, and they are in many cases disciplined by a man particularly trained in this function. The old style, one teacher to a class plan is entirely out of date.[13]

INDUSTRIAL DEMOCRACY

In discussing industrial democracy as a method of developing morale and securing friendly cooperation it is desirable for present purposes to restrict this broad subject in several particulars. This may be done by eliminating, first, labor unions as they are commonly organized.

Although the labor union has great potentialities for developing employer-employee cooperation, unions in general do not seem to have been particularly interested in increasing the productive efficiency of their respective industrial establishments or in providing machinery for effective leadership by management.[14] Labor unions are organized primarily for the purpose of securing a larger distributive share in industrial income. As one writer, citing John R. Commons, observes: ". . . the old trade union almost invariably stresses the conflict of interest between employer and employee. Their chief reason for existence is the belief that the interests of employees and employers are in opposition in the fundamental matter of distribution of the value product of industry."[15] Moreover, collective bargaining is not in consonance with the spirit of cooperation. According to Dr. Ferger, "The word 'bargaining' has a militant connotation which might be deprecated by sincere and social-minded students of industrial problems."[16] Labor unions have their own function to perform, and management should seek their cooperation; but, at the same time, management should go further and provide for better cooperation within its own organization structure.

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[13] F. W. Taylor, *Shop Management* (New York: Harper and Brothers, 1911), p. 199.

[14] Notice is taken below of certain tendencies of labor to become more interested in cooperation for production and in scientific management.

[15] Emmett B. McNatt, *Employee Representation in the Lehigh Valley Railroad Shops* (Doctor's Thesis, Cornell University, 1932), p. 180.

[16] Wirth F. Ferger, "The Place of Collective Bargaining in our Modern Industrial Life," in *Contemporary Industrial Processes* (Extension Bulletin, Vol. X, No. 2, Chapel Hill: University of North Carolina Press, 1930), p. 39.

In the second place, "industrial democracy" may, for present purposes, be limited somewhat in scope and function. It may be taken to mean, therefore, that the workers as a group or in groups have only a voice or a share in the conduct of the enterprise, not that they either completely control or manage its affairs. As previously explained, there is a science of management, an art of management in applying the scientific principles and laws, and a profession of management whose members are versed in the knowledge and skilled in the practice of managing. It is the teaching of scientific management that the function of managing, or of applying human effort in the accomplishment of work, should be in charge of expert professional managers, who represent neither capital nor labor as such. As Professor Commons concludes: "The outstanding fact in our investigation is the importance of Management. . . . It is management that attracts capital through the confidence of investors, for the bulk of investors, like the bulk of laborers, do not want and cannot manage industry."[17] Industrial democracy is to be regarded properly as a complement and a supplement to management, and not as its successor or substitute. Commons further concludes that: "It is even immoral to hold up to this miscellaneous labor, as a class, the hope that it can ever manage industry."[18]

The idea of giving labor as such a voice or a share in the conduct and operation of an enterprise, it should be noted, is in principle nothing new or radical in business administration. Although many a business executive will still remonstrate with, "*I* am going to run *my* business," there are several parties who have a vital interest in *his* business that are not always reticent in demanding a voice in the conduct of the internal affairs of the enterprise. In the first place,

[17] From John R. Commons, *Industrial Government* (1926), p. 269. By permission of The Macmillan Company, publishers.

[18] From John R. Commons, *Industrial Government*, p. 267. By permission of The Macmillan Company, publishers.

the suppliers of materials and products usually dictate to their dealers and agencies their resale prices, the quantity and kind of their advertising, specific methods and systems of conduct, etc. Second, banks often appoint the auditors and even the treasurer of the concern. Again, the customer, if a very large one, may exercise an enormous influence. Finally, landlords, lessors of equipment, risk takers or insurers, trade associations and governmental agencies often stipulate quite definitely certain policies and procedures. In fact, it does not seem to be entirely facetious to say that it is only unorganized labor and the small unorganized stockholders that are disfranchised in the conduct of *their* enterprise.

As confusing and as inefficient as this voice or interference in the administration of an enterprise may upon first thought appear, much may be said in its behalf. What was at first bitterly opposed by the individualistic business executive often came to be later condoned and finally appreciated and welcomed. Frequently the banker's treasurer made good and the manufacturer's stipulations as to policies and practices saved the day. The lesson was often learned that cooperation with other parties vitally concerned in the progress and prosperity of the enterprise was worth far more than complete freedom of action by the "rugged" executive. Likewise the voice and the cooperation of labor, instead of being spurned, may be welcomed. It may—as it frequently has—prove to be a worthy member of the controlling interests of every enterprise. Such then is the proper role of industrial democracy in the conduct of the internal affairs of the business enterprise.

It is still a question worth asking, however, whether labor as a body really desires a share in management other than, of course, for acquisitive purposes. There are two views to this question. One view is presented by Colonel Franklin:

> What we must do with our labor, is to make it happy because you can easily get a happy man to do things well and you cannot constantly force the unhappy man. . . . I am old-fashioned enough to believe that the worker is happier when he is doing his particular work. That is

> where his ability lies, and management must—management of ability—be reasonably autocratic.[19]

Another attitude is voiced by A. Barratt Brown:

> The worker is not concerned to complain of any of the developments in industrial organization that mean a higher standard of managerial and technical efficiency in these directions. What he has reason to resent is the failure to provide the means by which he may exercise an intelligent interest in the more efficient administration of the concern in which he is employed, and a share of responsibility over matters in which he is particularly concerned or in which he feels he has a contribution to offer from his own experience and knowledge.[20]

In accordance with the first view the laborer should be made happy by good management. He should be dealt with through his union if he so desires. If he has no union, management may step in and help him organize a company union. Or, preferably, management may so satisfy him by good working conditions, personnel policies, welfare activities of various kinds, by personal leadership, and by high wages that he will not desire to share in management, nor, perchance, even desire to be in a labor organization of any kind.

/ In accordance with the second view, labor should be made cooperative by good organization. That is, labor should not be dealt with as a separate entity on the outside, but as a part of management itself, on the inside. It is this view that labor desires a hand in management and that the workmen should be given collectively certain functions to perform which are vital to the conduct of the internal administration of the enterprise. /

The first of these views has ordinarily been the view of the exponents of scientific management. However, the main purpose in bringing in the subject of industrial democracy at the conclusion of this study is to show that the second view may not be antagonistic to the true principles of scientific management, and that the value of the collective force of the workmen should be recognized and provided for in the structure of an organization.[21]

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[19] B. A. Franklin, "What is Needed from the Management Point of View," in *Reducing the Cost of Business* (The Society of Industrial Engineers, Convention Proceedings, Vol. VII, No. 1, 1923), p. 18.

[20] A. Barratt Brown, *op. cit.*, p. 142.

There are good reasons to support this view. One reason is found in the large size of modern industrial establishments. To quote J. M. Turner: "But as industries have grown in size to the dimensions of small cities, management is coming to feel that in the interest of profits, there is one duty which it can no longer perform efficiently and which it is willing consequently to delegate to the workers. This is the function of discipline."[22] In such enterprises the influence of strong leadership peters out long before it reaches the men in the lower ranks. It may be that there has been a change in the attitude and in the *mores* of the labor force within recent times making labor harder to discipline. However, it is in the large-scale establishments that the problem has often become most acute.

If the workers are to be entrusted with the function of discipline, it is pertinent to question their competency for the task. Such self-discipline might at first thought appear almost preposterous. However, experience seems to point largely to the contrary. One of the founders of scientific management states: "It is a universal experience that no judge is as severe and unrelenting as the more righteous contemporary with the same temptations and opportunities."[23] Much will depend, of course, upon how labor is prepared for and assisted in its task. If management is much to blame it may be expected that labor will render its verdicts in favor of the workmen. Moreover, it will be the duty of management to educate its labor to its just responsibilities, to provide adequate machinery for discipline and for justice, and to create a morale in consonance with the scheme.

Another reason for the view that employee representation is not inconsistent with scientific management is found in the psychology of the situation. In other words, it is good psychology to recognize the workers as a group.

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[21] See Morris L. Cooke, "Some Advice to Labor Unions," *The Society for the Advancement of Management Journal,* III, No. 1, January, 1938, p. 2.

[22] From J. M. Turner, "Joint Control," in John R. Commons, *Industrial Government* (1921), p. 377. By permission of The Macmillan Company, publishers.

[23] Harrington Emerson, *The Twelve Principles of Efficiency* (5th ed.; New York: McGraw-Hill Book Company, Inc., 1919), p. 142.

> The group represents a common factor in the industrial situation. Problems of supervision and management grow out of the fact that in industry the individual is always acting under group conditions. It is true that the individual, characterized by a specific pattern of ability, temperament, individual wants and desires, represents the human material of industry. Nowhere is his individualism completely submerged, but at no time at work is the individual freed from the powerful influence of the group. The significance of these influences must not be overlooked in the attempt to formulate a scientific basis for supervision and management in industry.[24]

Thus it is psychologically wrong to attempt to deal with workmen only as individuals. If a workman is influenced by his crowd, the practical thing for management to do is to recognize the crowd and attempt to influence it by employing good crowd psychology.

A final reason may be called the conference habit. Management should take counsel with its labor force as a matter of course and for the benefit of both parties. According to J. M. Turner again:

> Our conclusion, then, is that the kind of management which secures the best production from labor is management which is kept closely in touch with labor through machinery which forces both parties through their representatives to sit together constantly listening to mutual criticism, and to discuss constantly the problems of industry.[25]

And in the words of A. Barratt Brown:

> . . the avoidance of friction and the harmonious settlement of grievances and disputes are more likely to occur where there is a genuine attempt to secure co-operation in the day-to-day working of a concern and prior to,

[24] Morris S. Viteles, *Industrial Psychology*, p. 619.

[25] From J. M. Turner, "Joint Control," in John R. Commons, *Industrial Government*, pp. 383-384. By permission of The Macmillan Company, publishers.

> rather than after, any contemplated changes. It is the habit of consultation that is important, and if that has not been acquired it is not likely that sporadic efforts to procure agreements after trouble has arisen will be assured of success.[26]

The essential advantage of the conference habit is that it keeps management and men together as one integrated body working on their common problems.

If it is desirable to recognize workmen in groups and to confer with them on industrial matters, the next problem concerns the type of organization and the organizational machinery needed. The committee type is, quite apparently, the only structural type that provides for joint action throughout the organization. This type has been described and explained in the two preceding chapters, and it will be necessary here only to point out its application to the present problem.

The most fundamental application of the committee principle in employer-employee cooperation is found in the shop committee.

> *The right to be heard,* as it is known in other forms of organization, has long been exercised by organized workers for the redress of their own grievances, but when based on a real community of understanding it may be institutionalized as a means of bringing common thought to the solution of all problems involving the common interest. This ideal is becoming a practical reality in the way shop committees and other committees are organized in many industrial establishments.[27]

Its basic importance is further attested by A. Barratt Brown:

> . . . the foundations of a better system of co-operation and self-government in industry must be laid in the local unit of production and even in the workshop itself. No grandiose superstructure of Industrial Councils will be stable unless it is based upon the sound working co-opera-

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[26] A. Barratt Brown, *op. cit.*, p. 146.

[27] James D. Mooney and Alan C. Reiley, *Onward Industry!* (New York: Harper and Brothers, 1931), p. 25.

> tion of the staff and personnel of the individual department and workshop.[28]

Thus, the organization structure most provocative of friendly cooperation should begin with a committee of workers in each of the various shops, divisions, or other basic operating units. The next step is then to set up committees for larger units such as the main departments or major functions of the enterprise. And, finally, there should be a committee, or a representative body of some form for the enterprise as a whole such as the company union or employee association. There is ample need in organization for both the local committee and the company union.[29] There need be no overlapping of functions if the jurisdiction of each group is carefully outlined in the beginning.

Without attempting to exhaust the possibilities of uniting the workers for cooperation, morale building, and joint action one observation may be offered. This is, the possibility of grouping the workers and the foremen, according to two or more bases at the same time. As previously explained, there are many logical bases for the division of the work of an enterprise and for the grouping of the personnel. Thus, the workers may be grouped for committee representation according to the basis of shift, location, trade, function, rank, etc., or according to several of these bases. A worker may vote for one committeeman to represent him in his trade or rank, and for another to represent him in his particular location, shop, or department. If this dual representation plan is carried out all the way to the top, the company representative body might naturally take the form of a bicameral legislature. In this way both the trade and the shop or locality would be represented. The functional structure in organization planning provides quite adequately for dual or multiple basis grouping.

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[28] A. Barratt Brown, *op. cit.*, p. 146.

[29] See Ordway Tead and Henry C. Metcalf, *Personnel Administration* (3rd ed.; New York: McGraw-Hill Book Company, Inc., 1933), p. 412. There is, of course, wide insistence that the National Labor Relations Act of 1935 and the several more recently enacted state laws on the subject have practically abolished company unions. However, this legislation is directed against company unions that have been established to take the place of independent unions for the purpose of collective bargaining. Shop committees and company unions may still be created and used legally as a link in organization for effective production. Indeed, company unions may be used as an agency for collective bargaining under present legislation if the firm's employees prefer it to an independent union. It may, possibly, be necessary and desirable that two organizations be established, one for the purpose of collective bargaining in the creation of which the management does not participate, and another for the purpose of cooperation in production. The second would then become a part of management for facilitation and improvement in production and in the welfare of the workers, thus an organization for peace. The first organization might then meet the requirements of the law or of any labor union which may be concerned, and would constitute a more or less militant type of organization with authority highly concentrated in the hands of its agent or agents.

/The vital question, however, in employee representation in management after all is not how the committees are constituted, but how much authority the committee shall have and what shall be its functions. As stated in explaining the committee type, committees range in authority all the way from the board of directors or trustees with absolute authority to the class or discussion group which has no authority. It was also explained that committees may act in a legislative, an executive, or a judiciary capacity, or in two or all of these capacities. Thus, committees may be variously limited in their field of activity and in their authority. Just what function or what authority the various committees should have cannot be safely answered in any categorical fashion. Literature abounds in schemes and in appraisals of their respective merits, but in regard to all of them the words of Phil A. Grau are apropos. He says ". . . it must not be expected that industrial democracies, workmen's councils, shop forums, and similar institutions can be bought over a counter like suits of clothes."[30] The principle is the same in establishing committees for employee participation as in establishing any structural type: each particular situation must be analyzed and studied in its entirety before it is undertaken to prescribe the type or scheme that should be adopted.[31]

Finally, there appears to be a growing recognition of the fact that scientific autocracy and industrial democracy are not necessarily incompatible in principle. This is to say that a structure may be built to accommodate rule by scientific and impersonal law, but so modified that the approval of a group may be required in addition to expert opinion for the enforcement of the scientific laws. The essential difference is that where both principles are adhered to in the same organization the expert may have to come before the group and expound the law he seeks to apply or has applied and convince the members of its accuracy and fitness. These groups may serve as legislative bodies to hear proposals for future action, or they may serve as juries to hear and try cases in regard to past action and conduct. They may be given full power to veto by majority vote or by a two-thirds or three-fourths majority vote, or they may be given power to delay, modify, or appeal.

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[30] Phil A. Grau, "Selling the Idea of Modern Management," in *Industrial Leadership* (The Society of Industrial Engineers, Vol. IV, No. 5, June, 1921), p. 48.

[31] See Morris Greenberg, "How to Operate Under a Collective Agreement," *The Society for the Advancement of Management Journal,* III, No. 1, January, 1938, p. 7.

The joint research committee represents a step in the direction of this coalescence of principles. Its value from the employer's point of view is explained briefly by Dr. Morris L. Cooke as follows: "The employer profits by joint research because there are brought to the surface facts which would elude any technique in which the workers did not participate. Practices once adopted are more easily maintained because they have the sanction of common consent."[32] Mr. J. P. O'Connell, a labor leader, is quoted to reveal his adherence to the scientific principle. He says, "I see no need for arbitration in situations, where a decision can be reached through ascertaining the facts. Cold facts cannot be compromised."[33] The president of the United Textile Workers in 1929 stated that: "For the industry as a whole, the United Textile Workers propose that a joint research committee be appointed, on which both management and labor will be equally represented."[34]

Labor is cooperating with management also in other ways. For example, according to one who has made a survey of labor-management cooperation: ". . . the progressive unions and leaders recognize the need for constructive co-operation and for regular and frequent discussions with management in place of occasional meetings at irregular intervals for collective bargaining."[35] The contribution which labor is ready, willing, and able to offer is indicated in an editorial on "Company Unions" by Mr. William Green, President of the American Federation of Labor:

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[32] Morris L. Cooke, "Cooperative Research as a Factor in Industry," *The Textile Worker*, XVIII, No. 12, March, 1931, p. 718. A paper given before the University of North Carolina Section of the Taylor Society at Chapel Hill, N. C., February 25, 1931.

[33] *Ibid.*, p. 717.

[34] Wirth F. Ferger, *op. cit.*, p. 49.

> Organized labor is not a force to be feared by those who seek true industrial progress. On the contrary, it has the power to make a contribution to industry which can be had in no other way. When given a share in responsibility for production and a voice in the direction of policies concerning the workers, organized labor has shown that it can meet industrial problems with judgment and resourceful ability. Under various systems of union-management cooperation workers have felt a responsibility and a partnership in the industry which has stimulated intellectual effort and brought substantial benefits to the industry. Prevention of waste, saving of materials, better production methods, even inventions of machinery to increase efficiency have been part of the workers' contribution. . . . Such an attitude as this, and such a spirit as that with which the workers have undertaken their task of industrial improvement under union-management cooperation is evidence of a very real appreciation of their responsibilities to industry. . . .[36]

There are also other evidences of employee interest in the efficiency of management and the application of scientific principles. As one student observes: "It is only within the last few years that any important positive attempts have been made by trade unions to cooperate with employers in increasing efficiency and eliminating waste . . ."[37] The plan of the Baltimore and Ohio Railway is often cited as an example of this type of cooperation.[38] The compatibility of scientific management and industrial democracy of some form is also recognized by Harlow S. Person, who says: "Organized labor and scientific management technicians are today jointly further developing the technique of scientific management as the fundamental and substantial institution for establishing stability and harmonious relations in industry."[39] Thus, two plans of industrial reform, long thought to be diametrically opposed in principle, are apparently becoming reconciled and merged to form perhaps a new plan containing the good qualities of each of the two original plans without their respective shortcomings.

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[35] J. H. Richardson, "Recent Developments in Industrial Cooperation in the United States and Canada," *International Labour Review*, XX, No. 1 (1929), p. 75.

[36] William Green, "Company Unions," *American Federationist*, XXXIII, No. 7 (1926), p. 1427.

[37] Emmett B. McNatt, *op. cit.*, p. 181.

[38] See also "The Naumkeag Experiment," *Bulletin of the Taylor Society*, XV, No. 2 (1930), pp. 63-79.

In concluding the discussion of the principle of intimate friendly cooperation it should be recalled that the organization structure is only a static mechanism, or a permissive factor in creating morale and cooperation. The best-laid schemes and the most elaborate structural machinery will prove of no avail unless proper preparation is made for their acceptance and their maintenance by the dynamics of management. Human beings are motivated and controlled by many factors of an ethereal nature, as Mr. Karl C. Griswold recognizes in the following statement:

> It is said that men in making a decision are influenced not by what they think but rather by how they feel. Particularly is this true of the workers—they constitute the great mass, and the feeling of the masses always dictates, on the premise that everybody knows more than anybody.
>
> Faith is a quality of the feelings. Faith is the backbone of co-operation, it is the foundation. Destroy the foundation and you ruin the whole structure.[40]

Thus, in attempting to instill cooperativeness and good will into the labor force of all ranks, use must be made not only of good organization and of education but also of practices and methods which invoke confidence and faith. Should labor and capital cease to war, or need no longer to stay prepared for war, and beat their swords into plowshares, labor may champion the true principles of scientific management more than capital in its supremacy ever has. Such is perhaps the prediction of one of the leading exponents of scientific management, who says: "Scientific management because of its impersonal and uncontrollable logic, will ultimately prove to be the workers' Bill of Rights."[41] Industrial democracy could reign through, or in the method of, scientific autocracy.

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[39] H. S. Person, "Scientific Management and Economic Planning," *Bulletin of the Taylor Society,* XVII, No. 6 (1932), p. 214.

[40] Karl C. Griswold, "Co-operation," in *Industrial Leadership* (The Society of Industrial Engineers, IV, No. 5, 1921), p. 80.

INTEGRATION

The procedure in organizing scientifically as developed in this study begins logically with an analysis of the work to be done by the organization. This analysis must be preceded, of course, by a survey of the market and of economic conditions in order to determine the objectives of the enterprise in terms of product, service, or the work to be done. After a survey of the broader aspects of production has been made, the microscope is substituted for the telescope. The work to be done is analyzed in minute detail and resolved into the smallest and simplest of units, called, for convenience, units of work. The units of work are then further analyzed in order to ascertain and measure the elements or ingredients of work. These ingredients or productive factors, as they are variously termed, are, it will be remembered, as follows: (1) the objective, as mentioned above; (2) money or capital; (3) machines and other equipment; (4) power or energy; (5) materials and supplies; (6) recorded knowledge; (7) the personnel, or men; and (8) management and organization, which combine the other factors.

After a complete analysis of work, the first stage in synthesizing begins by combining these ingredients so as to perform useful units of work. This combination takes place fundamentally in minute quantities. Although these productive factors may be viewed by the general administrator and economist at long range and in huge quantities as economic resources, they must be viewed by the organizer and manager at extremely close range and dealt with in very small amounts. The latter must combine materials, measured by the ounce or the inch, with a machine of certain specifications, consuming energy in terms of watts or British thermal units, or with human effort in terms of therbligs, etc., in order to produce his required unit of work.

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[41] Morris L. Cooke, *ibid.*, p. 718.

The synthesis of work next calls for the combining of these units successively with dissimilar units to constitute what has been designated as a performance, or a step in production. These units are then combined to compose operations. In some cases entire operations may be performed entirely by automatic machines utilizing no direct manual labor; the synthetical procedure is then taken care of in the construction of the machine and belongs properly therefore in the province of the engineer. In other cases operations are performed entirely by hand, with a modicum of tools and equipment. The procedure in synthesizing manual effort begins by uniting therbligs in series to compose so-called cycles of motions. Cycles of motions are then combined to form manual operations, which are in turn combined, either in series or in parallel depending upon the complexity of the operation, to compose a job, the activity of one person.

In the scientific determination of the content of a job consideration must be given not only to the work to be done but also to the prospective job holder. As emphasized by Dr. Viteles,

> Every job has two aspects:
>
> *a. The work to be done.*
> *b. The man who is to do it.*[42]

The province of the function of personnel, as viewed in this study, properly includes that aspect of the job concerning the man, just as the function of engineering includes the machine. The work to be done, by either man or machine, is the particular province of the function of management in general. However, since the engineer and other technicians as well as the foremen and executives are all men, the function of personnel re-enters the procedure of organizing at every stage. Management in getting its work accomplished employs; therefore, men, both as manual workers and as experts in charge of the various technical ingredients or factors of production. Organization as a function is concerned in matching the various operations in the system of work to be done with jobs, or compound units of human effort, whether of a laborer, a technician, or an executive.

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[42] Morris S. Viteles, *The Science of Work,* p. 68.

The scientific determination of operations in the synthesis of work, and of jobs in the synthesis of human effort, marks the culmination of the first stage of organization procedure. These two phases of the science of organization proceed apace throughout all stages of the process of internal organization. This stage ends when operations are assigned for execution to the confines of some particular job. Ordinarily it has been assumed that the organization of work should come first and that of human effort second. However, neither process should be carried out to the utter exclusion of the other. As Professor von Beckerath has noted:

> The manner of employing the human element in the plant differs from the organization and utilization of the physical equipment. The conditions under which workmen and employees operate efficiently do not always conform to requirements for the most profitable use of materials and of machinery, and every good organization of production is a compromise between the exigencies of both.[43]

The procedure in organization is thus at every stage a dual process, involving on the one hand the work and on the other the worker, whether with brain or brawn.

The second stage in the procedure of organizing begins with operations and jobs and unites these to form still larger units. The synthesis of the work to be done continues by uniting successively dissimilar operations to constitute processes, or systems, as they are sometimes designated. Processes or systems are next united so as to produce the completed product or service. The synthesis of jobs proceeds by grouping jobs to form departments, divisions or functions, and these to form perhaps still larger or more extensive groups which constitute the major organic functions or subdivisions of the entire enterprise. At every stage in this procedure the main purpose is to match work with workers, as, for example, a process with a department, or a system with a function, and so on.

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[43] H. von Beckerath, *Modern Industrial Organization* (New York: McGraw-Hill Book Company, Inc., 1933), p. 79.

The particular methods employed in the synthesis of work are determined almost entirely by the technology of each respective industry. For instance, the method of combining the various operations and processes in the manufacture of shoes differs from the method employed in the manufacture of automobiles. Generalizations can go little further than to point out and describe organizational types or patterns, such as the analytical, the synthetical, and the straight-line types, or the continuous, the lot or batch order, and the job-order types. There may be also patterns of location of operations such as the belt conveyor system or the system of grouping all similar operations together. In all types or patterns, as previously indicated, certain functions must be performed such as designing, routing, scheduling, dispatching, etc., whether performed repeatedly for each individual unit of production or provided for once and for all by the system of production and the layout of the establishment. These various details of the organization of work must be determined for each particular product and each industrial establishment after thoroughly analyzing the conditions and facilities extant in each situation.

The particular methods employed in the synthesis of jobs and functions are determined jointly by the type or pattern of the organization of work and by the conditions affecting the personnel in its performance. In this synthesis four basic structural types have been described, and compared as to their advantages and disadvantages, and need not be further summarized here.

The second stage in organization procedure ends with the synthesis of all work necessary for the completion of a product or service, and of all jobs necessary for carrying on this work in a single establishment. A third stage may be said to begin with single products or establishments as its units and to combine these units to constitute what are called integrated enterprises, or more briefly, "integrations." This stage overlaps in many cases a possible fourth stage in which an entire industry is coordinated for productive efficiency. This stage, designated as rationalization, will be discussed in the following section.

Integration is a continuation of the science of the organization of work applied in its broader or administrative aspects. It represents the principle of organization applied to the work of large groups of individuals organized for production. It is a logical, and a historical, concomitant of division of labor, although it has seldom received the study or the emphasis in economic literature accorded to the division of labor. This is attested by one of the most able students of the subject, to wit:

> As in biological evolution, differentiation and integration have gone hand in hand. And as business organizations have grown larger, they have grown more complex.
>
> It is clear that complexity depends upon the twofold process of specializing and combining. The reason for specialization or division of labor hardly needs discussion here. Common information covers the advantages of splitting processes up so that machinery and special skill can be utilized to the largest extent. But, as yet, less is known of the integration side of complexity.[44]

The evolutionary stages and the types of integration are also indicated by this author. He states:

> . . . specialization and division of labor were the dominant aspects of business organization during the eighteenth and nineteenth centuries.
>
> More recently we have reached the stage of *integration by industries,* or "vertical combination," in which, while differentiation through division of labor goes on apace, the distinguishing characteristic is a combining of the stages of production within great branches of industry under a single direction and management.
>
> Finally, we find a distinct but similar tendency in the combination of more or less closely allied processes for the purposes of "diversification." This is a sort of *aggregation* or "horizontal integration" which leads manufacturers to take on related products.[45]

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[44] From Lewis H. Haney, *Business Organization and Combination* (3rd ed., 1934), pp. 40-41. By permission of The Macmillan Company, publishers.

[45] From Lewis H. Haney, *Business Organization and Combination* (1934), p. 40. By permission of The Macmillan Company, publishers.

Integration, according to Marshall, relates to ". . . a growing intimacy and firmness of the connections between the separate parts of the industrial organism, . . ."[46] It is concerned ordinarily with the productive as distinguished from the acquisitive aspects of combination. Integration is not therefore particularly concerned with monopoly power, price control, promotion profits, or the peculiar methods and types of ownership and legal control such as the pool and the trust. It involves only a combination of units, functions, or services for purposes of efficient production of economic goods.

As suggested by Haney, in the above quotation, integration may be of several types. In the vertical type, productive units are combined in such a way that the finished product of one unit becomes the raw material of another, thereby eliminating the middlemen and effecting economies in the continuous movement of materials. In horizontal integration, productive units are combined which perform similar processes or services or make identical products. The economies inherent in this type result from specialization, mass production, a more efficient utilization of overhead, and the better performance of certain services by members of the organization which were theretofore performed by outside specialists or agencies. A third type known as circular or complementary integration makes use of both the vertical and the horizontal principles. In this type allied products are manufactured or marketed which are complementary in some way to the main line. In marketing, other lines or services are added which may be distributed to the same buyers with little extra overhead cost. In manufacturing, products are added which may make joint use of similar materials, machines, skill, or processes, either simultaneously or intra-seasonally. This type ". . . has rapidly become the most important and significant type in the present-day movement, and will undoubtedly be the prevalent form of consolidation in the coming decade."[47]

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[46] From Alfred Marshall, *Principles of Economics* (2nd ed., 1891), I, p. 300. By permission of The Macmillan Company, publishers.

[47] Charles S. Tippetts and Shaw Livermore, *Business Organization and Control* (1936), p. 465. Courtesy of D. Van Nostrand Company, Inc., publishers.

Integration may occur, therefore, in many forms. There may be complete integration with respect to only one factor, or partial integration with respect to many or all factors. Many of our large holding-company combinations are integrated only with respect to finance. Chain stores integrate vertically when they perform the functions of wholesaling and jobbing. Integration is practically forced upon industries of the synthetical and the analytical types, owing to their multiplicity of materials and products. Moreover, there is an element of integration in any large-scale enterprise which performs certain functions or services with its own personnel and facilities instead of securing their performance by other organizations. There is no fundamental difference, from the standpoint of productive efficiency, between controlling and processing materials, and controlling and processing any other productive factor or ingredient. An enterprise may not only produce its own raw materials but it may also produce its own power, build and repair its own equipment, operate its own financial institutions, employ a research staff for the provision of necessary knowledge, formulae, or inventions, or it may establish and maintain mill villages, schools, or hospitals or sponsor other welfare activities in order to strengthen its control over its labor supply. Integration takes place when any of these activities are brought into the synthesis of work under a unified management and control.

Integration is thus similar in principle to the synthesis of work of the previous stage, as outlined above. It is concerned with the same productive factors, it employs the same methodology in the combining of smaller units to form larger or more complex units of production, and the same basic functions of planning, routing, scheduling, and dispatching in the coordination and control of its activities. The integration stage begins with units of work already combined into marketable products or services and continues by combining the processes of production of these products or services with other operations, processes, and functions in order to produce new or additional products or services or to complete additional stages in their production.

Integration is thus the synthesis of work of the previous stage applied on a larger and broader scale. Intra-plant transportation and communication of the previous stage are expanded in this stage to inter-plant transportation and communication, or traffic management; belt conveyors become railway and steamship lines. Likewise plant layout becomes a matter of regional or geographical location, and instead of operation and process coordination and control there is plant, factory, and product control.

The synthesis of jobs and functions in this stage is likewise based upon the same principles of organization structure as previously outlined, but applied on a grander scale. Emphasis upon each of the various functions and activities shifts, however, to some extent with the scale of operations. Job classification and standardization become more important, and greater attention is paid to routines, systems, and policies. What was the task of one specialist becomes now the work of a group. Consequently the coordination and control of individuals is supplanted by the coordination and control of groups organized as departments, corps, or divisions. Moreover, in this stage specialists, foremen, and minor executives become so numerous that these as well as the common workers are dealt with by mass control methods. The organization of workers also proceeds beyond the shop committee and the local or company union to types of labor organization approaching the industrial union.

As already pointed out, the structural type most suited to large and extensive organizations is generally considered to be the line-staff or the divisional type. This type may be supplemented by committees at the higher administrative levels, and possibly displaced by the departmental or functional type at the lower levels or within each of the plants. The problem of organization planning that becomes most conspicuous at this stage, however, is the matter of centralization versus decentralization. That is, just how much authority and what duties should be delegated to the local plant managers? Such a question must be determined largely by the nature of the problems in each situation. A balance must be struck among the factors favoring each alternative, as suggested by Jones:

> . It is clear that for the lodging of any administrative function, and the resting of the corresponding responsibility, there must be a certain ideal point in the administrative hierarchy of any organization. This point is where the problem of keeping in touch with the specific details of the agencies of the action controlled is approximately equal in difficulty to the problem of keeping in touch with the general plan of which that action is a part. To move a function from this point towards headquarters is to lose touch with specific conditions; to move it closer to the agencies of performance is to lose touch with the general plan.
>
> As organizations grow, one function after another should take its departure from headquarters and pass down the line of administration, drawn to the lower levels by the necessity of keeping in touch with local conditions. . . . Headquarters gradually change from a directing into a coordinating agency.[48]

The exigencies of each situation must be carefully analyzed, such factors as distance, time, communication and transportation facilities, the need for emergency action, knowledge and skill required, and the character of the executive and expert personnel being taken into consideration.

RATIONALIZATION

As previously indicated, rationalization may be regarded as the fourth phase in the organization of work. Rationalization as a movement has been given a variety of definitions. It was defined at the World Economic Conference held in Geneva in 1927 to include:

> . . . the methods of technique and organization designed to secure the minimum waste of either effort or material. It includes the scientific organization of labor, standardization both of material and products, simplification of processes, and improvements in the system of transport and marketing.[49]

[48] Edward D. Jones, *Industrial Leadership and Executive Ability* (1920), p. 70.

[49] James A. Bowie, *Rationalization* (London: Sir Isaac Pitman and Sons, Ltd., 1931), p. 7.

The subject as thus defined is quite broad indeed, and much beyond the scope of the present study. It is mentioned in this chapter merely to point out the attempt being made to apply the principles of scientific management and organization on a larger and a more extensive scale.

The scope of rationalization and its relationship to scientific management and organization are indicated, in brief, by Dr. Person:

> Starting from opposite poles scientific management and rationalization are apparently moving each toward the other. With a background of experience with state socialism, the latter thought first in terms of socially controlled reorganization of all industry and then of scientific management of the particular situation. Scientific management, on the other hand, with its background of extreme individualism, started with the problem of the individual plant, then proceeded to application of its principles and technique to the management of groups of plants under one ownership. Socially it has developed the concept of voluntary trade standardization. Ultimately, although probably still with individualistic bias, it may in America come to be applied to the organization and control of entire industries and all industry.[50]

Thus, rationalization continues the process of scientific organization and integration until an entire industry is brought under common control and management, and it apparently stops little short of the ultimate stages of national and international planning.

The evolutionary course of the organizational process progresses from the small unit and the limited area to the largest of producing units scattered over perhaps the whole world. Organization in its first stage is concerned with nothing larger than the operation and the job, and its limits are those of the single shop or laboratory. In the second stage, the scope of the organizational process is extended to include the work and the functions of an entire plant or enterprise, and here it ends. In the third stage, organization encompasses the internal relationships of a large and extensive combination of plants and enterprises. Rationalization carries the procedure a step further to include an entire industry or, perhaps, a group of related industries. It represents the culmination of scientific management and organization as a technique for increasing the productive efficiency of industry.[51]

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[50] Harlow S. Person, "Origin and Nature of Scientific Management," in The Taylor Society, *Scientific Management in American Industry* (New York: Harper and Brothers, 1929), pp. 15-6.

It is understood, of course, that rationalization, and integration as well, are concerned in their entirety with more than only their techniques of production. For any producing unit there are both internal economies and external economies. These two aspects are well recognized by James A. Bowie, as follows:

> Rationalization has obviously two sides, the one external, concerned with the grouping and relating into some sort of organic unity of a large number of previously independent, competing enterprises; and the other internal, concerned with the efficient organization within each unit of the functions of production, finance, *personnel*, and distribution.[52]

It is in regard to the second of these two sides that scientific management and organization make their contribution in methods and techniques. External economies belong properly to the broad field of economics in general.

It should be noted, however, that when either integration or rationalization takes place many activities that were of an external nature for the small or single-product enterprise become in these stages matters of internal administration. For example, a large part of the purchasing, merchandising, and selling activities carried on among the small units become matters of requisitioning, stock control, and issuing in the consolidated unit. Likewise, the making of payments by currency, checks, drafts, etc., is superseded by inter-office memoranda and bookkeeping entries. Moreover, the function of valuing, performed among independent units by bargaining and negotiation in the market, is in large part performed by cost accounting and other statistical and appraisal agencies of the integrated or rationalized unit. Thus, the field of exchange in economics is encroached upon by accounting, administration, and other functions of production; and external relationships handled by bargaining, negotiation, or legal contest are pushed to other and larger fields while their former spheres are supplanted by factual determination, policy enunciation, and administrative orders.

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[51] See A. Barratt Brown, *op. cit.*, p. 151.

[52] James A. Bowie, *op. cit.*, p. 10.

The main organizational problem arising in the rationalization stage is similar to that arising in integration, namely, the problem of decentralization. As Lord Melchett observes:

> The real problem of rationalization and the merging of big enterprises consists in effective central control with sufficient elasticity lower down to allow action to be neither arrested nor delayed, and to prevent the chiefs at the head from being encumbered by too much detail, at the same time keeping a grip on all essential features of policy, such as finance, expenditure, sales, and relations with other great groups of industrialists throughout the world.[53]

The solution to this problem is found in the principles of scientific management and organization as hereinbefore outlined. The application of these principles begins at the bottom of the organizational structure and continues through every level or rank in the administrative hierarchy to the top. The essential nature of this technique is epitomized by Dr. Person in the following paragraph:

> It should be noted—a fact of transcending importance—that the ability to control huge multi-plant enterprises through harmonizing of centralization and decentralization is possible only where there is a preceding progressive development of scientific management in every lesser area of an enterprise; in unit operations, production in general, merchandising, general administration and human relations. It is the splendid fruit of these basic developments. Control of such huge enterprises is dependent on controls throughout every unit of the enterprise; the larger an area of control, the more essential is control in every constituent unit. Therefore effective rationalization of an entire industry, or of all industry

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[53] Quoted in James A. Bowie, *op. cit.*, p. 22.

> in a nation, is possible only to the degree that constituent plants are scientific management plants.[54]

If organizations are scientifically constructed there is thus no limit to their manageable size or diversity.[55]

In conclusion, it may be noted that the principles of scientific management and organization as here developed are believed by many to provide the proper basis or starting point for mastering the broad problem of the organization and administration of the production of economic goods in general. The possibilities inherent in the universal application of these principles, as well as the deficiency of the present structure, are declared by Urwick in the following passage:

> Were it possible to agree as between the nations that the purpose of all economy, the objective to which every proposal should be referred, was a higher standard of life for the world community, there is no inherent impossibility in applying the conceptions and technique of management research to every aspect and level of economic activity. Until it is done, until modern business is conducted in conformity with the principles which created it, the present confusion will not only continue, but grow inevitably worse. The difficulties are obvious. The "mental revolution" which is scientific management comes hardly. Habits of mind, cherished traditions, darling prejudices, will have to be sacrificed. Science knows neither frontiers nor financial dogmas (sometimes miscalled principles), neither capitalism nor communism. From the management standpoint it is concerned with one central question, how, in the light of an objective consideration of the facts, the economic system may be organized at every level, from the worker at the bench to the last details of international exchange, so as most effectively to fulfil its defined function?
>
> There is no alternative. At the moment the facts of the system of trade and industry by which the peoples live are world-wide and interdependent. The conceptions

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[54] Harlow S. Person, "Scientific Management and Economic Planning," *Bulletin of the Taylor Society*, December, 1932, p. 219.

[55] See *ibid.*, p. 218.

> on which it is conducted are scarcely adequate to the successful management of a series of village shops.[56]

One should be again reminded that the principles of scientific management and organization are not offered as a panacea for all economic ills. These principles offer their contribution to economics essentially in its field of production. They apply to efficiency in the creation of physical utility, or use-values; they offer little directly to the great economic problems of exchange and distribution, which, according to many, seem to be the major problems confronting our present economy.[57] The economics of scientific management is not business or price economics, but engineering, commodity, or utility economics.[58]

Furthermore, these principles are without bias as to the ultimate control and ownership of the productive or operating unit. Their application begins with the workers and ends with the chief administrative officer or body, and it makes little difference to whom that officer or body may be subservient, whether to capital, to labor, to the consumers, to the suppliers of materials, or to the state. These principles were developed under capitalism, but in 1918 Lenin said, "We must introduce in Russia the study and the teaching of the Taylor system and its systematic trial and adaptation."[59] Finally, the proper application of scientific principles are safe from misuse only in the hands of the professional scientist, and it is in this instance the professional manager, specialized in his respective function or industry, that may properly apply the principles of the science of production organization.

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[56] L. Urwick, "The Study of Management—The International Position," in British Association for the Advancement of Science, *Business and Science* (London: The Sylvan Press, 1931), p. 16.

[57] The supposition is here, of course, that our present economic problems are those of the proper distribution of wealth, not of a greater production of goods and services.

[58] See Thorstein Veblen, *Engineers and the Price System* (New York: Viking Press, Inc., 1921).

[59] See A. Barratt Brown, *op. cit.*, p. 133.

CHAPTER IX

RECAPITULATION

To summarize the present study is merely to recount the process of beginning with elementary units of work and effort and combining these units to form ever larger and more complex units until a completely integrated and rationalized industry is finally organized. In order properly to comprehend this process, however, several explanations, limitations, and conceptions may need to be re-emphasized.

In the first place, a description of methods and a definition of terms are usually needed. As to methods in general, it is necessary to note only that the process of internal organization is regarded as a science, similar to other social sciences, developed by the same methods, and subject to the same limitations. The science of organization is defined as a phase or an aspect of management in general. Management, in its scientific aspects, has been defined as the science of applied human effort. Organization has to do with the correlation of the work to be accomplished with units of human effort, and with the structural arrangement of the units of effort for the purpose of their control. Both management and organization are regarded as being phases of, and generally subjacent to, administration, which has to do with the control of the establishment or enterprise in both its internal and its external activities. Finally, organization, management, and administration are regarded as belonging properly in the field of production economics.

In the second place, since human effort is the main subject or substance of organization, it would seem necessary to develop some sort of an elemental unit of this substance before it can be measured and dealt with in a truly scientific manner. Such a unit has been developed by F. B. and L. M. Gilbreth, and denominated the "therblig." The therblig is an elementary unit of manual effort, defined roughly as a simple motion or productive activity of some part of the human body. Therbligs have been classified into eighteen different kinds, each of which may be accurately described, measured as to time of performance, and evaluated in terms of physical exertion and fatigue. With the further progress of motion study in the determination and establishment of standard conditions and facilities for performance, the therblig apparently is destined to become a standard unit of manual productivity and possibly of labor cost.

It should be noted, moreover, that the therblig constitutes probably the nearest approach to a labor unit of value so far developed. Since Adam Smith first enunciated his labor theory of value and differentiated use-value from exchange-value there have been attempts to derive some kind of measure for utility and for the irksomeness or disutility of labor. The marginal utility group of economists were particularly interested in such a problem. W. S. Jevons, following Charles Babbage to some extent, went so far as to conduct experiments to measure the exertion and the fatigue produced by manual labor. However, it was not until F. W. Taylor attempted "to develop a true science for each element of a man's work" and that the Gilbreths began "to develop the science of The One Best Way to Do Work," both basing their work on the science of engineering, that a physical unit for measuring labor was ever approached. The therblig needs still much refinement, and perhaps modification, before it can serve as a universal unit of labor value. However, the field has again been opened up, and the point of attack indicated to the industrial psychologists, who are furnishing evidence that further progress may be expected. This unit merits, indeed, further study and further consideration in economics as well as in scientific management.

The process of synthesizing the work of an organization begins after this work has been thus analyzed into its most elementary units. These small units are then combined and recombined to constitute the work system and the process which culminates in the completed product or service. These work units are also classified into units of machine performance, and units of human performance. The units of human performance are translated into terms of therbligs, which are then combined so as to constitute jobs, or the total activities assigned to individual persons for performance.

The jobs must then be arranged in relation to one another and to the productive system to form a structure for the purpose of convenient and effective control. It is this synthesis of jobs, or of job-holders and their activities, that is the particular problem of the present study.

It should be noted in this respect that under scientific management the control of the work process or system is differentiated as a function from the control of the jobs and the respective personnel. The control of the work process, from the time that research and market analysis first determine and design the product until the product is completed, inspected, and delivered, is distinguished as the function of planning, or production control. The control of the workers in the performance of the predetermined operations, or in the execution of the plans, is distinguished in this respect as the function of execution or operation, or sometimes as management proper. It must be understood, of course, that planning and execution, or control and operation, are inextricably related throughout the process of organization. Planning and control must be exercised not only for the main production program, but also for operations, operators, facilities, and conditions. Likewise execution and operation are involved in making plans and in exercising control. In large-scale enterprises the organization and control of the personnel engaged in planning and controlling the production program constitute in themselves a problem of no small consequence.

Thus, there are differentiated two organizational problems in the process of production organization: the organization for the purpose of controlling the work to be done, and the organization for the purpose of controlling the personnel who are to do this work. The first of these problems is chiefly a matter of the technology of the particular industry and product; the second is largely a matter of psychology or, possibly, of a combination of psychology and technology. The second is usually studied as a personnel or a labor problem, since it is concerned in controlling the workers and their supervisors in their respective work relationships. The emphasis of the present study is upon the second of these organizational problems.

In the process of organizing the personnel for effective operation and control, several different methods or types of control relationships are manifest. The line type effectuates control by making every workman and every officer responsible to, and subject to the authority of, one and only one superior. In the line-staff type each person is still under the direct control of only one superior, but subject to be advised and possibly examined by others known as staff officers. In accordance with the functional method, control over the activities of any person is divided among several superiors all of equal rank and authority but each an expert in some different field or function pertaining to the subordinate's work. These three types are distinguished therefore by the manner of exercising personal control under each type. Thus, the line superior may issue orders and commands which must be obeyed, the functional officers issue directions and instructions pertaining to their respective functions, whereas the staff superior gives only advice, which is of course authoritative but not imperative. Finally, committee control is merely control by several individuals collectively or as a body. Committees may be classified with respect to these several degrees of authority and with respect to the various functions that they may perform. Each of these control types manifests certain advantages and disadvantages in operation. Each has its particular adaptations and applications, and each its shortcomings and limitations, all of which indicate the particular service of each respective type in developing the control structure of an organization.

The process of organization is further analyzed to determine the various principles, laws, and rules pertaining to the construction and the perfection of organizations of each and all types. It may be observed here that many of these various principles and laws are concerned not so much in developing the basic structure of the organization as in perfecting the intricate superstructure. Thus, for the sake of clarity and emphasis, these two phases of the organizational process may need to be distinguished.

The first phase or stage consists in analyzing the technology of the particular work to be done, in next developing a system for accomplishing this work, and finally in securing the necessary personnel for operating this system. The workers are regarded thus as machines or parts in the production process. This is in brief the entire process of organization according to the view of the technologist, the engineer, or the efficiency expert. This view emphasizes technology, systems, and devices, and it draws its illustrations usually from the fields of physics, mechanics, and hydraulics.

The second phase in the organizational process begins where the first leaves off and concerns itself not only with the relationships of the workers to the system of work, but also with the relationships of the workers to other workers of various functions and to the management and control of the whole organization. In this phase the workers are regarded not as mere machines in the system of work but as something more. They are regarded as independent sources of power and direction, as agencies in controlling machines, improving the system, eliminating waste, and as an extra force for emergency action and for continual growth and progress. This is the phase of organization stressed by the more recent school of scientific managers, as distinguished from the engineers and technologists. The modern scientific manager attempts to make of the personnel a part of management itself, a resourceful ally in production, and he tries to develop organization structure and superstructure to this end. His illustrations and analogies are more often drawn from the fields of biology, psychology, and sociology; his relationships are organic relationships. This phase of the organizational process is often overlooked by many students and business executives.

Finally, it should be noted that the process of production organization has its broader implications. The principles and methods of constructing organizations for individual plants and enterprises are applicable in large part to the organization of integrated enterprises and of whole rationalized industries. Scientific management and organization have furnished a technique for industrial operation and control, a technique which is without bias as to the ownership and ultimate control of the enterprise or establishment or as to the type of economic system under which it operates. Scientific management, it must be remembered, builds its system upon use-value; it is engineering economics and not price economics, its philosophy is the philosophy of welfare through abundance, it advocates high wages and more commodities at lower prices, and it preaches the gospel of efficiency in all undertakings both private and public. Scientific management seeks to substitute what John R. Commons has distinguished as "managerial" and "rationing transactions" from "bargaining transactions," especially under market conditions which do not permit of a fair competitive price. The goal of scientific organization is to make of a group of individuals a perfect organism for service that will operate with maximum efficiency and harmony.

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